A REVIEW OF FARM FORESTRY. PROBLEMS AND POSSIBILITIES IN AUSTRALIA

by

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ABSTRACT

The aim of farm forestry practices in the market place is to provide low cost forest resource irrespective of whether its use is for farm activities, industrial wood supplies, water or recreation demands.

To the rural landowner, farm forestry practices offer the opportunity of increasing the long term nett profits per hectare.

In order to motivate the rural landowner to consider farm forestry practices, both Federal and State Governments need to offer suitable financial incentives. This can best be accomplished through the provision of a separate section for forestry within the Income Assessment Act allowing for the peculiarities of the tree crop.

Farm forestry will only become profitable when Federal and State Governments actively assist in the development of a realistic market price structure for wood, which does not differentiate between wood produced by State or Private organisations.

Indirect measures to encourage farm forestry practices appear warranted and should be given careful consideration. These measures include the development of co-operative schemes and extension activities by State or Private organisations, incorporating farm planning systems.

An examination of direct measures of assistance showed that the present system of loans to farmers to establish woodlots is outdated and its effectiveness seriously eroded by inflation. Consideration should be given to the provision of grants which cover a proportion of the establishment cost of plantations.

Forestry practices are most profitable when wood production and conversion activities are situated near a large resource base. This is due to economies of scale. Farm forestry activities located within such areas would be most profitable.

If farm forestry is a desirable rural development, then there should not be discriminatory legislation based on the categorisation of rural landowners. In the agricultural sector, all rural landowners are eligible for subsidies, irrespective of ownership category. The same provisions should apply when considering farm forestry practices, especially when the majority of rural land owners are companies or partnerships.

In recent years farm forestry has become an attractive alternative for government policy makers when considering rural reconstruction policies, for it offers the opportunity of complementing agricultural production with the minimum of disruption and capital wastage and causing only gradual changes in pastoral based production.

The economic viability of the concept of joint agricultural and forestry production on the same area of land has yet to be demonstrated. This is because detailed financial evaluation on the agricultural aspects of pasture production and animal performance under various monocultures of fast growing wood species is not yet available.

Many overseas experiences would not be successful under Australian climatic conditions. Detailed evaluation of promising practices should be carried out before any broad scale application is considered.

INTRODUCTION

The interactions between forestry and the agricultural sector must be considered when reviewing farm forestry in Australia.

In Chapter 1, land use practices in Australia are reviewed. This chapter shows the evolution of present day practices and the conflicts over the use of forested land. The issues which involve forestry practices are not based primarily on a shortage of forested land but are due to the spatial imbalance of accessible and productive land.

Chapter 2 examines the agricultural sector setting. It is within this setting that the development of farm forestry practices are considered to be of greatest impact.

In Chapter 3, the forestry sector setting is reviewed. The market potential for Australian grown timber is discussed.

Chapter 4 traces the development of farm forestry in Australia from the aboriginal practices through to the present practices of fencepost, honey and wood fuel production. The problems facing farm forestry are discussed.

In Section 1 of Chapter 5 the current agricultural scene is reviewed. The advantages of tree cropping to aid in the reconstruction of the agricultural sector is discussed in Section 2. Section 3 examines the concepts of farm forestry and discusses the problems associated with applying the concepts of Hall and Brown (1969) and Tustin and Knowles (1975) to the Australian scene. A definition of farm forestry for Australian conditions is proposed.

In Chapter 6, the methods of evaluating the profitability of farm forestry are discussed.

Chapter 7 reviews studies made on the profitability of farm forestry in the Australian context. The studies have in common two factors;

(1) They attempt to show those situations where a shift of resources from agriculture to forestry is profitable.

(2) The studies consider only the national viewpoint, not the individual's viewpoint in considering profitability.

Existing measures of assistance to the agricultural and forestry sectors in Chapter 8 and 9 respectively, are reviewed.

Chapter 10 examines overseas experiences in farm forestry.

In Chapter 11 measures of assistance to encourage investment in farm forestry ventures are proposed. Areas of further research which warrant investigation are highlighted.

CHAPTER 1

LAND USE IN AUSTRALIA

1.1 INTRODUCTION

Agriculture and forestry production compete in varying degrees over the use of a major factor of production - land. Before reviewing the agriculture and forestry sectors it is desirable to trace the evolution of land use in Australia.

1.2 BACKGROUND

In 1788, sovereignty of the British Crown was proclaimed over the continent known as Terra Australis, later to become Australia. Despite this proclamation, real control of the land by the Crown was only achieved with the spread of settlement over the ensuing fifty or more years.

Because control of land followed rather than preceded settlement, a large area of land had already been committed to agricultural use before the authorities could determine otherwise.

In the latter half of the Nineteenth Century, demand for land increased considerably and various attempts were made to meet this demand equitably. These attempts generally proved abortive and towards the close of the century, legislation was introduced in each of the colonies to attempt to rectify the situation.

The approach adopted involved a shift from the use of land ownership restrictions to land utilisation provisions. These provisions were generally aimed at promoting closer settlement. The legislation attempted to restrict the size of land holdings

and promote more efficient (that is, more productive) forms of land use which invariably meant some form of agriculture.

1.3 DEVELOPMENT OF FORESTRY LEGISLATION

The official promotion of the goals of closer settlement had a significant impact on the forested area of Australia.

The areas involved, were found mainly east of and including the Great Dividing Range which runs the length of the Eastern Seaboard. These areas had the most reliable rainfall, often the most fertile soils and were most accessible because of their proximity to the coastline.

Early forest operations, such as Red Cedar extraction, laid down an infrastructure of bush tracks and sea port facilities. This infrastructure assisted the early settlers and stimulated the development of the coastal areas.

The Authorities (which by this time had become Colonial Governments) attempted to maintain control of these developments by issuing leases over large areas of forested land at fixed or nominal rentals. As the value of the timber trade increased, the revenue earning potential was recognised and gradually a system of royalties evolved. Those employed to enforce these revenue collections developed an interest in the future of the forest. There followed, at their instigation, restrictions aimed at preserving the forests by restricting timber getting activities. These restrictions, foreshadowed the development of more effective controls.

Following Federation in 1901, the States retained control of land useage and it was their prerogative to legislate for efficient

forest utilisation. By 1920, specific forest legislation had been enacted in all states.

In almost all cases, the rapid decline in the area of forest was a direct result of the pressures for settlement and land clearing for agricultural pursuits.

The depression of the 1930's temporarily reduced the demand for agricultural land and enabled the States to retain areas of forest that may otherwise have been alienated to agricultural usage. Since the end of the Second World War, further significant additions have been made to the total of areas dedicated as permanent forests although most of these were made from unalienated crown land.

1.4 CONFLICTS IN LAND USE

The last decade has seen a very rapid increase in the demands made by society on the limited areas of forested land remaining. This pressure has resulted in the development of multiple use concepts and policies which aim to accommodate a number of uses within a given area. This development has become an important issue in the community.

In Australia, the issues which involve forestry are not based primarily on a shortage of forested land but are due to the spatial imbalance of accessible and usable land.

Conflicts over the use of forested land have usually arisen because of the following factors:-

1. The rapid increase in real income per capita, individual mobility and available leisure time.
2. The disparity between the location of suitable forest land and the major centres of population.
3. A limited appreciation by the community of the factors involved in managing forested land and the long lead time required to meet increasing levels of demand for wood in the future.

CHAPTER 2

THE AGRICULTURAL SECTOR SETTING

2.1 INTRODUCTION

This chapter describes the characteristics and problems of the agricultural sector. It is within this environment that profitable form forestry practices must be developed, if they are to be adopted by the rural landowners.

2.2 BACKGROUND

Historically, farming has been the major economic activity which provided a basis for settlement of large portions of the continent. During this development era, agriculture was both a major component of domestic economic activity and the dominant source of foreign exchange earnings.

The importance of the agricultural sector within the Australian economy has steadily diminished in recent years. The major reasons behind this decline are:-

Firstly, an increasing share of Australia's resources have been transferred to the service sector.

Secondly, the prices of agricultural commodities have been falling in relation to the prices received by most other sectors in the economy.

Thirdly, the rapid build up in the mineral export industry has meant that agriculture is using a smaller proportion of the community's resources, yet still showing a substantial growth in productivity.

2.3 TRENDS IN OUTPUT PRODUCTIVITY AND INCOME

The volume of farm production in Australia increased at an average annual rate of 3% over the last two decades (Harris et al, 1974). However, in recent years, the rate has slowed down in response to the lower world prices received for agricultural products.

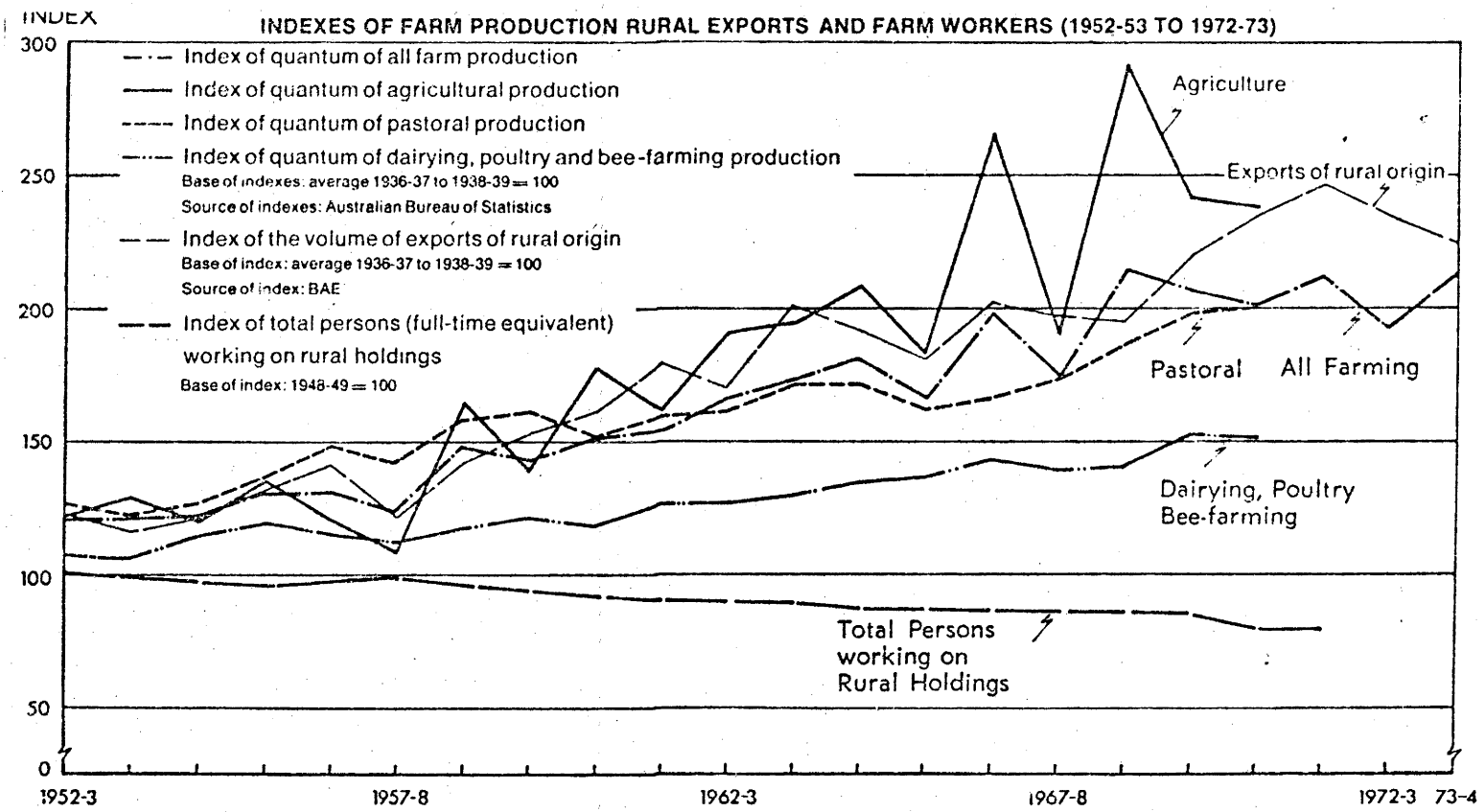
Figure 2.1 shows that sheep and wool production has stabilised after declining for a number of seasons. Expansion of beef cattle production has currently been curtailed due to the substantial drop in world beef prices. If these recent developments continue into the future, there could be a swing away from beef production back towards crop, sheep and wool production.

Crop production levels have been stable in recent years but the fruit growing and dairy industries remain severely depressed.

Figure 2.1 shows that, although growth in productivity has been substantial, total form costs have tended to rise more rapidly than the value of output. Prices paid for farm inputs have increased broadly in line with domestic costs, but farm prices for outputs have fluctuated widely with no persistent long term trend.

Measured in real terms, the trend in total farm income has been downwards. The number of family units directly dependent on farm income has also declined but not to the extent necessary to prevent a decline in the average real farm income per family.

FIGURE 2.1 Indexes of Farm Production Rural Exports and Farm Workers (1952-53 to 1972-73)



(Source: Rural Policy in Australia, 1974)

2.4 AGRICULTURE'S CONTRIBUTION TO THE BALANCE OF PAYMENTS

Figure 2.1 shows that farm production increased at approximately 3 % per annum during the postwar period. Australia's per capita food consumption has remained constant in recent years and resulted in the domestic market for farm products rising in line with the growth in population.

As rural production has grown faster than domestic consumption, export markets and prices have become much more important in recent years.

Table 2.1 shows the contribution of rural products to total export income. This has declined from over 80% in the early 1950's to near 50% in recent years. This is due largely to the relatively faster growth in the export of minerals and manufactured goods. This is depicted in Figure 2.2. An important aspect of this development is that non farm exports have been more stable both in quantity and price than farm exports. Hence total export receipts have tended to become more stable over time.

2.5 PROBLEMS OF THE AGRICULTURAL COMMUNITY

Harris et al, (1974) has discussed the problems of the agricultural sector in considerable detail. These problems are of direct relevance when considering a possible role for farm forestry in rural reconstruction. The main points raised by Harris et al, are presented below.

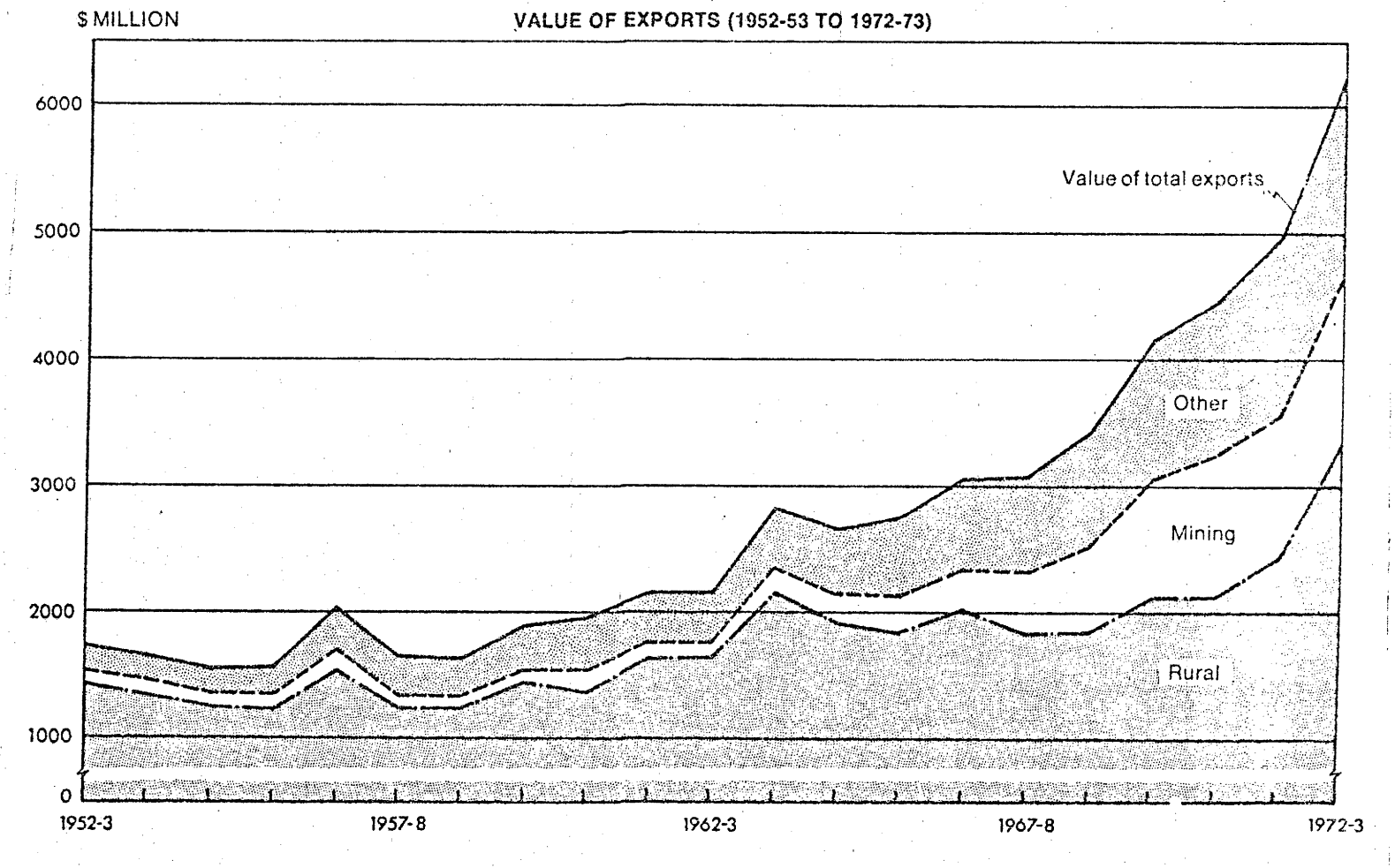
TABLE 2.1 Exports of Rural Origin and the Balance of Payments

Year	*Index of Volume of Exports of Rural Origin (Av. 1936–37 to 1938–39 = 100)*	*Value of Exports of Rural Origin (f.o.b.)* $m	*Total Value of Exports* $m	*Rural Exports as % of Total Exports*	*Balance of Payments on Current Account* $m	*Net Capital Inflow* $m	*Total Official Reserve Assets —at 30 June* $m
1952–53	123	1433.9	1766	81.2	389	—24	1039
1953–54	116	1381.9	1677	82.4	—4	45	1044
1954–55	121	1289.5	1575	81.9	—477	216	785
1955–56	131	1248.4	1591	78.5	—448	302	622
1956–57	142	1555.5	2014	77.2	217	205	1029
1957–58	121	1256.2	1662	75.6	—309	227	952
1958–59	143	1259.0	1645	76.5	—385	401	929
1959–60	153	1451.0	1900	76.4	—459	474	1009
1960–61	161	1399.8	1966	71.2	—737	657	1005
1961–62	180	1634.7	2181	75.0	—2	180	1115
1962–63	171	1644.5	2178	75.5	—472	620	1243
1963–64	201	2147.6	2812	76.4	—50	509	1695
1964–65	193	1927.5	2682	71.9	—754	460	1403
1965–66	183	1849.3	2755	67.1	—884	941	1447
1966–67	201	2013.0	3062	65.7	—660	537	1315
1967–68	197	1835.6	3094	59.3	—1143	1222	1277
1968–69	195	1871.2	3421	54.7	—1026	1174	1420
1969–70	220	2107.8	4182	50.4	—760	797	1538
1970–71	235	2104.6	4436	47.4	—873	1470	2280
1971–72	246	2419.3	4956	48.8	—416	1858	3764
1972–73		3306.9(*p*)	6215	53.2	677	303	4331
1973–74		3825.5(*s*)					

(p) Subject to revision. (s) Estimated by Bureau of Agricultural Economics.

Source: Australian Bureau of Statistics, *Balance of Payments*; Bureau of Agricultural Economics, *Trends in Australian Rural Production and Exports.*

FIGURE 2.2 Value of Exports (1952-53 to 1972-73)



(Source: Rural Policy in Australia, 1974)

2.5.1 Farm Population and Workforce

TABLE 2.2 Male Farm Employment (From "Rural Policy in Australia" 1974)

Item	Census Years (in thousands)		
	1933	1954	1971
Employees	103	62	50
Self Employed	155	200	135
Total Farm Operators	258	262	185
Employees and unpaid helpers	234	168	113
Total employed farmwork force	492	430	298
Unemployed etc.	36	6	N/A
Male farm workforce as a percentage of total employed male workforce	% 28	% 15	% 8

Table 2.2 shows that in 1933, approximately 500,000 males were engaged in the farming industries but this number declined to below 300,000 by 1971. This decline was accompanied by an increase in the level of capital employed on farms, the bulk of which was spent on farm mechanisation (Harris et al, 1974).

Between 1954 and 1971, the number of tractors increased from 25,000 to over 300,000 and although the agricultural workforce decreased by 31%, the level of farm output more than doubled (Harris et al, 1974).

TABLE 2.3 Age Distribution of Males in the Rural Workforce: Australia 1947–1971

AGE DISTRIBUTION OF MALES IN THE RURAL WORKFORCE: AUSTRALIA 1947–1971

Age Group	*1947(a)*		*1954(a)*		*1961(a)*		*1966(a)*		*1971*	
	Number	%	*Number*	%	*Number*	%	*Number*	%	*Number*	%
15–19	44 245	10.2	42 461	9.8	38 277	9.7	36 239	10.1	22 290	7.5
20–24	45 284	10.5	43 677	10.1	39 012	9.9	35 514	9.9	29 677	9.9
25–29	42 238	9.8	47 693	11.0	37 286	9.4	34 805	9.7	29 961	10.0
30–34	44 858	10.4	45 678	10.5	40 517	10.3	33 216	9.2	29 472	9.9
35–39	45 300	10.5	44 635	10.3	41 544	10.5	36 969	10.3	28 605	9.6
40–44	41 823	9.6	45 682	10.6	38 497	9.8	36 373	10.1	30 951	10.4
45–49	38 940	9.0	41 764	9.6	39 742	10.1	33 498	9.3	30 494	10.2
50–54	34 122	7.9	36 400	8.4	37 034	9.4	33 847	9.4	27 337	9.2
55–59	33 378	7.7	28 116	6.5	30 448	7.7	20 016	8.4	25 939	8.7
60–64	26 492	6.1	24 821	5.7	23 013	5.8	27 625	6.3	20 725	6.9
65 and over	35 962(b)	8.3	32 455	7.5	29 139	7.4	26 038	7.3	22 872	7.7
Total	432 642	100.0	433 382	100.0	394 509	100.0	359 140	100.0	298 323	100.0

(a) Exclusive of full-blood Aborigines.
(b) Includes 2733 persons whose age was not stated.

Source: CBCS, *Rural Land Use, Improvements, Agricultural Machinery and Labour, 1971–72.*

Table 2.3 indicates that the decline in the rural workforce is more pronounced in the younger age groups. Between 1961 and 1971, the number of males in the 15 to 25 year age group declined by 33% compared with a decline of 24% in the total male workforce.

However, many of the tasks previously carried out by farm labour are now performed by contractors who rely on off farm labour.

2.5.2 Farm Size and Economic Characteristics

Table 2.4 shows the number of rural holdings classified according to their type of major activity. The number of rural holdings has remained rather constant, at close to 250,000 and has changed by less than 3% over the last thirty years.

Table 2.5, although based on a relatively small sample shows the number of agricultural business units, by cash operating surplus and farm type as at 30 June 1973.

Some 55,232 rural holdings (24% of the total) are classified as "sub commercial". This means they have annual gross receipts of $2,000 or less (June 1973).

These holdings are not owned primarily for the farm output they yield but for other benefits they provide, which include, a rural atmosphere, the possibility of capital gains or some tax advantage. Beside sub-commercial holdings, some 25,695 rural holdings had negative cash operating surpluses as at June 1973 (Table 2.6).

The application of farm forestry practices on these areas would suit the owners if some form of contract management service or co-operative scheme was employed.

TABLE 2.4 Number of Rural Holdings Classified According to Type of Activity: Australia

NUMBER OF RURAL HOLDINGS CLASSIFIED ACCORDING TO TYPE OF ACTIVITY: AUSTRALIA

Type of Activity	*Number*				*Percentage Change*			
	1959–60	*1965–66*	*1968–69*	*1970–71*	*1959–60 to 1965–66*	*1965–66 to 1968–69*	*1968–69 to 1970–71*	*1959–60 to 1970–71*
Sheep—cereal grain	32 606	31 832	33 049	32 221	−2.37	3.82	−2.51	−1.18
Sheep	52 026	43 671	37 108	47 881	−16.06	−15.03	29.03	−7.97
Cereal grain	8 151	12 274	15 593	7 216	50.58	27.04	−53.72	−11.47
Cattle (meat)	11 267	16 339	19 768	23 435	45.02	20.99	18.55	108.00
Cattle (milk)	55 433	49 334	42 101	36 480	−11.00	−14.66	−13.35	−34.19
Vineyards	4 483	4 715	4 342	4 364	5.18	−7.91	0.51	−2.66
Fruit (other than vine)	13 304	11 977	11 180	11 018	−9.97	−6.65	−1.45	−17.18
Vegetables—potatoes	2 274	2 367	2 630	1 562	4.09	11.11	−40.61	31.31
—other	6 816	6 249	5 907	6 381	−8.32	−5.47	8.02	−6.38
Poultry	5 116	4 194	3 558	3 341	−18.02	−15.16	−6.10	−34.70
Pigs	1 276	1 576	2 166	3 084	23.51	37.44	42.38	141.69
Sugar	7 012	7 554	7 814	7 467	7.73	3.44	−4.44	6.49
Tobacco	976	992	1 080	1 153	1.64	8.87	6.76	18.14
Other	1 824	1 954	2 172	1 967	7.13	11.16	−9.44	7.84
Multi purpose	8 133	8 995	9 545	3 287	10.60	6.11	−65.56	−59.58
Total classified holdings	210 697	204 023	198 013	190 857	−3.17	−2.95	−3.61	−9.42
Unclassified sub commercial	29 993	33 878	40 454	42 563	12.95	19.41	5.21	41.91
Unused	11 553	14 261	15 800	16 065	23.44	10.79	1.68	39.06
Total all holdings	252 243	252 162	254 267	249 485	−0.03	0.83	−1.88	−1.09

Source: ABS, *Rural Industries Bulletin.*

TABLE 2.5 Number of Agricultural Business Units: by Cash Operating Surplus and Farm Type : Australia, 30 June 1973

Cash Operating Surplus	*Unit*	*Farm Type*										
		Sheep and cereal grain	*Sheep*	*Cereal grain*	*Meat Cattle*	*Milk Cattle*	*Poultry and Pigs*	*Fruit, vege-tables (a)*	*Other crops (b)*	*Multi-purpose (c)*	*Sub-commercial and unused (d)*	*Total*
Less than $0	no.	2 886	1 457	2 175	6 906	2 329	1658	6 070	*	1 823	36 813	62 508
Standard Error	%	22	28	28	16	21	28	27		22	5	6
$0- $4,999	no.	4 682	3 861	3 015	14 201	10 462	1864	11 565	1350	4 871	16 639	72 510
Standard Error	%	16	21	21	13	14	18	15	36	19	9	5
$5,000- $9,999	no.	4 526	5 609	2 697	5 136	8 736	937	5 345	1479	2 742	1 644	38 851
Standard Error	%	13	23	19	13	10	27	16	25	13	55	6
$10,000- $24,999	no.	7 422	7 093	3 105	6 710	8 241	1323	2 872	4542	3 782	*	45 217
Standard Error	%	9	14	19	13	9	33	16	12	13		5
$25,000 and over	no.	3 218	4 842	490	1 693	800	*	522	985	1 307	0	13 986
Standard Error	%	9	9	21	11	24		28	14	25	0	6
Total	no.	22 734	22 862	11 482	34 646	30 568	5911	26 374	8747	14 525	55 223	233 072
Standard Error	%	6	9	10	7	6	13	10	10	9	5	3

* < 500.

(a) Includes nurseries.
(b) Includes sugar, tobacco, cotton and oilseeds.
(c) Includes holdings other than those included in 'Sheep and cereal grain' which have no single predominant activity.
(d) Holdings with estimated gross receipts between $1 and $2,000 and holdings where no agricultural production was recorded, including holdings undergoing development.

Source: ABS, *Agricultural Finance Survey 1972–73.*

As mentioned in the text the Statistician cautions that the Agricultural Finance Survey was not designed to yield the type of data provided in Tables A2.6 to 2.10 and that caution should be exercised when interpreting tabulations.

The following specific points should be borne in mind:

(1) The definition of a business unit is given in the text; it does not correspond to definitions of business units used elsewhere.
(2) The estimates of the number of business units was based on a sample of 5800 from a total population of 248 000. When the population estimate for a cell is less than 400, no estimate will be given because any such estimate would be too unreliable.
(3) The business units included under the Farm Type classification were classified at the time of selection, and not upon receival of the AFS data.
(4) Cash Operating Surplus includes the purchases of livestock and excludes depreciation.
(5) Capital Expenditure excludes land transactions but includes expenditure on farm dwellings.

TABLE 2.6 Agricultural Business Units: by Cash Operating Surplus and Indebtedness : Australia, 30 June 1973

Cash Operating Surplus	*Unit*	*Indebtedness*					
		$0	*$1–$9,999*	*$10,000–$24,999*	*$25,000–$49,999*	*$50,000 and over*	*Total*
Less than $0	no.	36 355	13 803	5 773	3 376	3 201	62 508
Standard Error	%	7	14	17	27	13	6
$0–$4,999	no.	39 275	19 076	9 351	3 060	1 748	72 510
Standard Error	%	8	11	13	17	23	5
$5,000–$9,999	no.	16 916	10 066	7 205	3 560	1 104	38 851
Standard Error	%	8	16	12	18	22	6
$10,000–$24,999	no.	17 562	10 725	8 644	5 846	2 440	45 217
Standard Error	%	9	12	9	12	15	5
$25,000 and over	no.	5 081	1 964	2 162	1 631	3 148	13 986
Standard Error	%	8	14	21	18	14	6
Total	no.	115 189	55 634	33 135	17 473	11 641	233 072
Standard Error	%	4	6	6	8	7	3

Source: ABS, *Agricultural Finance Survey 1972–73*, see footnote to Table A2.6.

TABLE 2.7 Agricultural Business Units: by Cash Operating Surplus and Gross Receipts : Australia, 30 June 1973

Cash Operating Surplus	*Unit*	*Gross Receipts* $0–$4,999	$5,000–$24,999	$25,000–$49,999	$50,000–$99,999	$100,000 and over	*Total*
Less than $0	no.	49 040	10 814	1 615	698	*	62 508
Standard Error	%	6	12	14	18		6
$0–$4,999	no.	31 697	37 969	2 278	*	*	72 510
Standard Error	%	9	6	20			5
$5,000–$9,999	no.	0	34 114	4 118	534	*	38 851
Standard Error	%	0	7	14	19		6
$10,000–$24,999	no.	0	18 796	22 670	3 347	*	45 217
Standard Error	%	0	9	6	15		5
$25,000 and over	no.	0	0	2 791	8 052	3 143	13 986
Standard Error	%	0	0	11	8	9	6
Total	no.	80 737	101 693	33 472	12 947	4 223	233 072
Standard Error	%	5	4	5	7	9	3

* < 500.

Source: ABS, *Agricultural Finance Survey, 1972–73*, see footnote to Table A2.6.

TABLE 2.8 Agricultural Business Units: by Cash Operating Surplus and Capital Expenditure : Australia, 30 June 1973

Cash Operating Surplus	*Unit*	*Capital Expenditure (Excluding land transactions)*					
		$0	*$0-$4,999*	*$5,000-$9,999*	*$10,000-$19,999*	*$20,000 and over*	*Total*
Less than $0	no.	26 884	29 994	3 223	1 944	*	62 508
Standard Error	%	9	8	22	22		6
$0-$4,999	no.	21 301	47 330	2 592	1 077	*	72 510
Standard Error	%	10	7	21	27		5
$5,000-$9,999	no.	5 547	28 830	3 136	977	*	38 851
Standard Error	%	12	8	14	31		6
$10,000-$24,999	no.	2 634	30 321	7 649	3 714	899	45 217
Standard Error	%	14	6	9	18	27	5
$25,000 and over	no.	750	5 514	3 493	3 117	1 112	13 986
Standard Error	%	34	10	12	13	14	6
Total	no.	57 116	141 989	20 093	10 829	3 045	233 072
Standard Error	%	6	4	6	9	12	3

* < 500.

Source: ABS, *Agricultural Finance Survey, 1972-73,* see footnote to Table A2.3.

Although there is a considerable range in the sizes of farm firms, they are generally small by most urban business standards. Only 4,200 or 2.2% of agricultural business units had gross receipts exceeding $100,000 in 1972-73 (Table 2.7).

In 1972-73, 33% of agricultural business units were estimated to have a cash operating surplus of $10,000 or more and 8% of $25,000 or more (Table 2.5).

2.5.3 Farm Investment and Debt

The Bureau of Agricultural Economics in the publication "Rural Credit in Australia" 1972,showed that the agricultural and pastoral industries are among the more capital intensive of Australian industries; whether measured in terms of capital per labour unit or per dollar of output and considerably more capital intensive than manufacturing industries.

Continued viability of farm enterprises requires not only the gradual replacement of existing depreciating assets; but also new investments in order to expand the scale of operations and keep abreast of technological developments and ahead of the cost-price squeeze. Wage rates are continuing to rise and where it is technically possible,will continue to make the substitution of capital for labour more desirable.

Traditionally,most of the agricultural capital expenditure has been financed from farm income and as a result it has been highly dependent on agricultural prices. It has also been influenced by the farmer's assessment of future developments and the availability of outside credit.

These trends are shown in Tables 2.9 and 2.10.

TABLE 2.9 Capital Expenditure - Rural Holdings (a)
(Million Dollars)

Industry Classification	1968-1969	1969-1970	1970-1971	1971-1972	1972-1973
Sheep and cereal	138.3	94.6	50.7	59.8	88.9
Sheep	79.3	73.5	43.4	29.7	65.7
Cereal grain	74.8	42.9	14.5	26.6	24.3
Meat cattle	40.9	52.0	65.4	96.7	108.3
Milk cattle	77.9(b)	72.3	65.9	64.7	68.6
Poultry, pigs		20.1	28.3	17.1	19.1
Other	184.0	149.6	136.5	123.7	217.3
Total	595.2	505.0	404.7	418.3	592.2

(a) Excludes purchase of livestock (b) Includes pigs

(Source: ABS, Agricultural Finance Survey, see footnote to Table A2.6)

TABLE 2.10 Trends in Gross Rural Indebtedness
(Million Dollars)

As at 30 June	Major Institutional Lenders					All Lenders (a)
	Major Trading Banks	Pastoral Finance Companies	Develop-ment Bank	Other	Total	
1955	442	130	10	194	776	
1960	474	204	14	282	974	
1965	584	259	72	375	1,290	
1969	939	338	162	516	1,955	
1970	998	349	176	559	2,082	
1971	994	333	192	585	2,104	2,973
1972	963	292	202	634	2,091	3,293
1973	1,051	303	198	669	2,221	2,731

(a) Australian Bureau of Statistics

(Sources: Reserve Bank of Australia, and ABS Estimates of Gross Indebtedness of Agricultural Producers, Ref. No. 10.62)

Table 2.10 shows that indebtness is lower on smaller holdings. Only a third of all commercial farms holdings have no debt.

2.5.4 Business Organisation

There was a particularly rapid increase in the formation of farm partnerships and private companies in the 1950's and early 1960's. Family partnerships have now replaced sole ownership as the most important form of farm business organisation. In 1970-71 there were over 125,000 partnerships in rural industries (compared with 55,000 in 1953-54). More than 117,000 of these were family partnerships (see Table 2.11).

The adjustments which have taken place in farm business organisations do not necessarily imply any change in the structure or management of the properties concerned. Mostly they represent a change in legal status rather than in basic organisation, with the family farm remaining the most important type of farm unit.

TABLE 2.11 A Sample Survey of Various Characteristics of Primary Producer Taxpayers

Item	*1966–67*	*1967–68*	*1968–69*	*1969–70*	*1970–71*
	%	%	%	%	%
Percentage of primary producer taxpayers who are:					
Members of partnerships .	61.2	61.8	62.8	63.8	63.6
Wage and salary earners .	22.4	23.4	23.4	24.0	25.5
Property income earners .	52.3	53.5	53.5	54.4	53.8
	$	$	$	$	$
Average wage . . .	1,797	1,789	2,017	2,211	2,444
Average property income .	442	447	498	551	610
	%	%	%	%	%
Wages and salaries as % of total net income . .	14.1	20.5	16.5	20.2	23.6
Property income as % of total net income . . .	7.7	12.5	9.3	11.4	12.4

The data in Appendix Tables A2.11 and A4.4 were obtained from a sample survey of incomes of primary producers and other taxpayers conducted by the Commissioner of Taxation for the Rural Policy Working Group.

The sample sizes were relatively small—they varied from year to year in the range of 3000 to 3500 'primary producers', 1800 to 2600 'other businesses', and 3200 to 3500 'wage and salary earners'. In the time available, it was not possible to stratify the sample by sex and grade of income. A comparison of the survey data with the tabulated income tax statistics for the whole population showed a reasonably close relationship for several aggregates, but an important element in this comparison was precluded by a change in the method of coding the occupation of taxpayers.

For the above reasons, caution should be exercised when interpreting these tables.

Source: Commissioner of Taxation, *Primary Producer Survey 1974.*

CHAPTER 3

THE FORESTRY SECTOR SETTING

3.1 INTRODUCTION

The use of trees as a cash crop is a complex undertaking due to the peculiar cash flow patterns of Forestry. Forestry has large capital outgoings in early years and an inability to make returns,usually until some twelve to fifteen years have elapsed.

If the growing of trees as a cash crop is to be adopted by investors, it will only occur if there is an assured market.

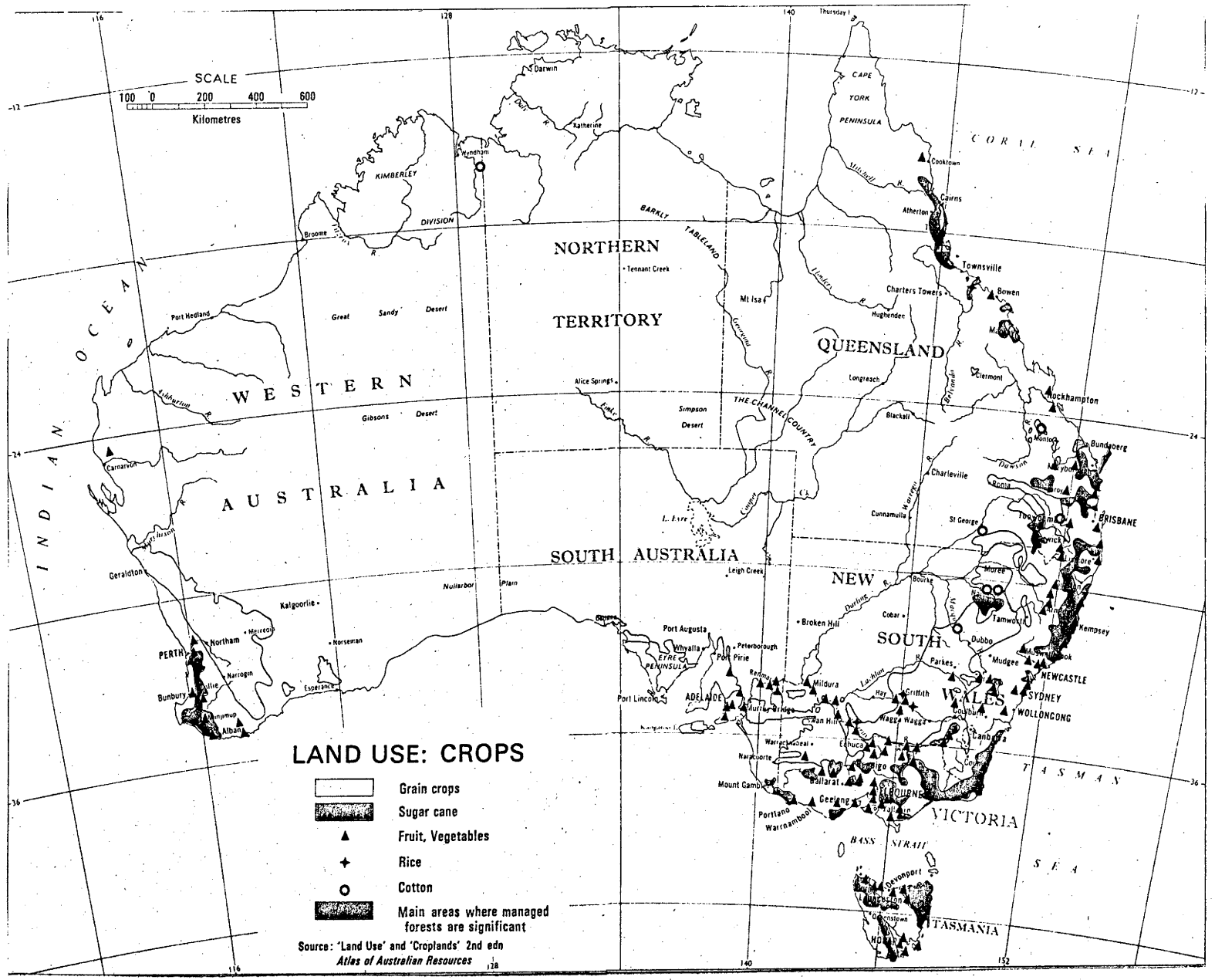
In this chapter the growing and management of the tree crop; the processing of the raw material into saleable products; the problems of forest resource development and the market potential for Australian grown timber are discussed in some detail.

3.2 THE FOREST RESOURCE

Map 3.1 depicts the main areas in Australia where managed forests are significant.

Of the 140 million hectares of woodland in Australia (18% of total land area) some 42.5 million hectares is considered productive or potentially productive forest (Forwood, 1974). This area is generally confined to the hinterland although 25% can be regarded as interior forest, consisting of cypress pine, tropical Eucalypts and paperbarks.

The major areas of productive forest are ecologically more complex than the remaining woodland, enjoy a higher rainfall



MAP 3.1 Land Use : Crops

and to some extent continuous with the major centres of population. As a result, they are subject to intense and wide ranging land use pressures which range from flora and fauna protection to water catchment protection, recreation needs and the production of industrial wood supplies and minor forest products such as honey and essential oils.

Table 3.1 details the types and extents of forest areas in Australia.

TABLE 3.1 (Source: Forwood, 1974)

Type	Area
Rainforest	1.9 million hectares
Eucalypt forest of temperate Australia	29.3 million hectares
Tropical Eucalypt and paperbark forest	6.5 million hectares
Cypress pine forests	4.4 million hectares
Plantations	0.5 million hectares

Table 3.2 shows how control of the forest area is exercised.

TABLE 3.2 (Source: Forwood, 1974)

Control	Area
Dedicated primarily to timber production	11.7 million hectares
Not dedicated primarily to timber production but over which the Crown holds timber rights	19.9 million hectares
Dedicated as national parks from which timber production is excluded	1.8 million hectares
Private forested land held freehold or leased from the crown and over which the occupier has timber rights	9.0 million hectares

Within the publicly owned forests, timber production occurs on sixty percent of the area although only 35 percent is dedicated to timber production as the primary use. National parks which specifically exclude timber production in favour of uses such as protection, water catchment and recreation, comprise a further five percent of forested land.

Privately owned forest land comprises 21 percent of forested land and whilst much of it is largely unmanaged, some of it is under considerable pressure for conversion to agricultural uses.

The same pressure is being exerted on areas of Crown land under lease, including areas over which the Crown has retained timber rights.

Natural forests comprise almost 99 percent of the productive or potentially productive forest area with plantations comprising the remaining 1 percent. Some of the plantations, especially those of exotics,have been established in areas of woodland and reclaimed agricultural land, rather than forest itself and thus constitute a nett addition to the forest area.

3.3 TRENDS IN FOREST RESOURCE USE

3.3.1 Introduction

The production of an individual forest product is usually carried out under a specific management regime. This is important to the rural landowner because depending on the location of his property to market outlets, it is possible for him to produce one or more of these products. The production regimes include indigenous timber production, plantation timber production, water quality and yield, recreation potential and minor forest products production.

3.3.2 Indigenous Timber Production

The productive and potentially productive indigenous forests (rainforest, eucalypt forests and cypress pine forests) occupy an area of some 42 million hectares. This area however, includes 1.8 million hectares of national parks from which timber removal is excluded (Forwood, 1974).

During 1970-71, the log and pulpwood removals from native forests totalled 9.2 million cubic metres of which 7.3 million cubic metres were sawlogs and the balance, pulpwood. Indigenous log removals represented about 81 percent of the output from all Australian forests - both indigenous and plantation forests (Forwood, 1974).

The Resource Panel of Forwood (1974) anticipated that by the year 2010, the sustained utilisable volume of roundwood available from indigenous forests will increase slowly to 10 million cubic

metres but of this volume only 4.4 million cubic metres will be sawlogs. The balance of 5.6 million cubic metres will be pulpwood. It is anticipated that the output from the native forests will represent only 35 percent of the total logs and utilisable pulpwood required by industry. The balance is expected to be supplied from plantations.

The small nett increase in availability from the native forests from 0.8 million cubic metres by the year 2010 will occur for two reasons (Forwood, 1974).

Firstly, there will be a substantial decline in the sawlog availability due to the exhaustion of the cut of virgin Crown lands and private property.

Secondly, there will be an additional and therefore compensating pulpwood availability as a result of management measures applied to Crown forests during the second half of the century.

The nett result will be a slightly increased total availability from the native forests.

3.3.3 Plantation Timber Production

Plantation forestry was commenced in Australia, both to alleviate a natural hardwood/softwood imbalance which has always existed; and also to provide a source of wood for industry from within concentrated areas of management.

At the 31st of March 1972, 457,000 hectares of coniferous plantations and 27,800 hectares of native broadleaf plantations had

been established (Forwood, 1974). Although in 1970-71 it represented approximately 1 percent of the productive forest area it supplied 2.1 million cubic metres of wood or 19 percent of the total Australian forest production (Forwood, 1974).

If the programme proposed in the Production Forest Development Plan of the Forwood Conference 1974 is implemented, the area of plantations will be increased to 1.14 million hectares by the year 2010. This will represent less than 3 percent of the Australian productive forest area. It will, however, provide some 65% of the total wood requirements.

The anticipated sawlog production from these plantations at the year 2010 will be approximately 13.2 million cubic metres or 75 percent of the total requirements and additionally the yield of pulpwood from the plantations will be approximately 5.6 million cubic metres or 50 percent of the Australian requirements.

3.3.4 Water Requirements

Annual water consumption in Australia is expected to increase from the current level of 7.5 million megalitres to somewhere between 12 and 25 million megalitres by 2010, depending on future irrigation developments.

Even the highest level of consumption of 25 million megalitres per annum would still represent less than 10 percent of Australia's total available water resources. However, because of the spatial imbalance between the catchment areas and the areas of demand, it is probable that in the future, greater use will be made of the

uncommitted or presently underutilised catchments in New South Wales and Queensland (some of which are major timber producing areas) for water production.

Increasingly, multiple use management will occur in these areas with a higher priority being given to water production and quality vis a vis timber production.

3.3.5 Recreation Pressures

It is anticipated that the use of forests for recreation will increase at a rate in excess of the growth of population due to increasing urbanisation of the population together with greater mobility and increased leisure time. The pressure is likely to begreatest in areas closest to major population centres. The rate of increase of forest-orientated recreation is estimated to be of the order of 8 percent per annum (Forwood, 1974), which will result in a doubling of use within ten years and a sevenfold increase by the year 2000.

The contribution which forests can make to recreation is not restricted to public forests but also extends to private forests. Private forest owners will face problems in financing of appropriate recreation facilities and have to face legal difficulties e.g. public risk liability if they allow public use of their land.

The impact of recreational usage on production forestry, although covering a gradient of intensity will generally fall into two broad categories:-

(1) High intensity use requiring relatively small areas of land together with high investment in recreation facilities.

(2) Low intensity use over a large area of land based on the utilisation of existing roads and tracks but with a minimal requirement for special facilities.

As high intensity recreation use precludes use of the areas for most other activities, it is the second category, low intensity use, which has the greatest implications for production forestry, environmental protection and watershed values.

3.3.6 Minor Forest Products

This group includes the chemicals derived from the forest but used in pharmacutical and industrial applications; honey, edible fruits and fungi, and at certain stages of a forest's development grazing for domestic animals.

As yet these values are not fully realised but it is likely that there is considerable opportunity for their future development within a wide range of forest management regimes.

3.4 MANAGEMENT PRACTICES OF THE FOREST RESOURCES

The marketing panel of Forwood (1974) predicted that during the four decades between 1970 and 2010, the demand for wood products in terms of gross roundwood equivalent will increase from 16 million cubic metres to 28 million cubic metres.

The 1970 demand was partly met by a substantial volume of imported wood based products. In consequence, the objective of nett self sufficiency early in the Twenty First Century will require that the output of Australian forests be increased by approximately 100 percent. This additional production must be obtained from

virtually the same, or possibly a lesser area of forest. However, it is recognised that except for the rehabilitation of forests degraded by past fires and uncontrolled cutting, the yield from native forests cannot be increased to meet the total forecasted Australian demand. Indeed, in keeping with the principle of conservation, it is likely that there will be reduced production within some forested land which will be needed to meet other important requirements.

The immediate and only satisfactory solution seen to meet the future Australian timber demand is to establish additional plantations of fast growth species. The species so far shown to be most suitable for plantation forests are exotic pines and a number of Eucalypt species.

It has been estimated that if the total plantation area was increased to 1.14 million hectares by the year 2010, the resultant production added to that of the managed natural forests would be sufficient to meet the Australian requirements at that time. The area envisaged (1.14 million hectares) will occupy only 2.7 percent of the present productive and potentially forest land.

Although financial constraints have generally restricted the expansion of fast growing plantations to land already owned by the major forest organisations, the increased use of agricultural land may avoid many of the environmental complaints arising from the conversion of low production Eucalypt forest to high production plantations. The potential for tree farming in conjunction with agricultural production is immense. Much work needs to be done on what systems of farm forestry to employ, species choice and markets.

3.5 FOREST CONVERSION INDUSTRIES

The greatest profit in tree growing is obtained where the grower is involved with the processing of the raw material whether as an owner of a conversion plant or through a co-operative scheme.

In the early 1970's, the forest conversion industries contributed approximately $1,600 million or nearly 5 percent of the gross domestic product (Forwood, 1974).

The future economic impact of the forest conversion industries is shown in Table 3.3.

TABLE 3.3 Economic Impact of Forest Conversion Industries (Source: Forwood, 1974)

Item	Year (figures in $ million 1966-67 prices)			
	1967-68	1980	2000	2010
Direct contribution to Gross Domestic Product.	415	807	2254	3767
New Investment	68	252	430	532
Direct Employment (thousands of people)	105	121	186	259

The forest conversion industries consist of three particular sections. These are wood and wood product industries, pulp and paper industries and forest harvesting.

3.6 PROBLEMS OF THE FORESTRY SECTOR

3.6.1 Resource Development

Examination of the forest resources supply/demand balance contained in the Production Forestry Development Plan (Forwood, 1974) shows that, without the development of additional production forests, there will be a continuing deficiency of forest produce. Details of this deficit are given in Tables 3.6 and 3.7.

If the shortfall in supply is to be overcome, it will be necessary to establish additional plantations and to extend the intensive management of some of the native forests. Moreover, a substantial increase in the production of pulp will be required and this will only be achieved by curtailing wood chip exports if Australia is to achieve self sufficiency in wood pulp at that time.

Any increase in the rate of resource development will depend on the availability of finance. Because the benefits from forestry expenditure are not obtained until well into the future, and as governments have more claims for finance than they have funds available, there is often reluctance to invest in forestry. This is despite its potential profitability and increased economic welfare in both itself, and in industries and communities based upon it. Moreover, the timing of cash flows obtained from forestry investments are usually not able to meet the traditional stream of interest and principal repayments required by most lenders.

Forestry is therefore not an attractive form of investment for most people without special inducements being offered.

In Chapter 4, current assistance for softwood afforestation provided by Federal and State Governments is discussed in some detail.

This assistance includes Federal loans to State Forest Services for afforestation and woodland schemes for private forest owners.

This aid is not available to private forestry companies. They have been given some assistance under income tax concessions, the withdrawal of which would be likely to reduce the rate of private investment in the future.

Intensive management of indigenous species on highly productive sites close to markets has not been practised extensively in Australia due to limited finance. To expand the areas under intensive management, additional finance will be needed.

3.6.2 Resource Location and Size

High transport costs have restricted the utilisation of some of the less desirably located indigenous forests. In addition, many of these forests are either too small or their unit area yields too low, to permit the establishment of large integrated forest industries.

3.6.3 Resource Quality

Many indigenous forests have been cut over numerous times. The reduction in quality of old growth indigenous logs has resulted in increased waste and reduced recoveries. Softwood log quality should improve the situation when the softwood plantations reach maturity.

3.6.4 The Handling of Forest Produce

Many of the problems currently associated with the hardwood sawmilling industry are due to the small scale of operation.

The installation of production plants of optimal size is more likely to be achieved in a situation where a sufficiently large base of raw materials, suitably located, is available.

3.6.5 Utilisation of Residues

It has been estimated that the volume of re-usable slabs and offcuts produced from sawmilling operations in Australia currently amounts to approximately 2 million cubic metres per annum. Of this total, less than 0.4 million cubic metres are utilised. This is because distances of pulp mills from sawmills are excessive or the small size of the sawmill makes the installation of a chipper uneconomic.

3.6.6 Pollution Control

Pollution control measures in the wood using industries, will be strengthened in the future. The costs of implementing the control measures will, in some cases be high, and are likely to cause an increase in the prices for wood products. In most instances, this should not affect the competitive position of forest products, as the alternative materials production costs may be expected to show a proprotionally greater rise with the implementation of environmental protection measures.

3.6.7 Government and Industry Policies

More effective government/industry relations are unlikely in the absence of a single organisation which has the support and co-operation of all sections of the wood based industries.

3.7 THE MARKET POTENTIAL OF AUSTRALIAN GROWN TIMBER

3.7.1 Price Movements for Wood and Wood Products in International Markets

The Forwood Finance Panel (1974) considered the possibility of overseas prices for wood products continuing to rise at faster rates than general price levels. Reports by the Food and Agricultural Organisation of the United Nations and the Forestry and Timber Bureau, Canberra, suggested to the panel that increasing living standards, particularly in the under developed nations, and depletion of the more readily accessible supplies from the traditional sources in the Northern Hemisphere will continue to produce significant rises in real prices in international markets.

On a world scale there is little evidence of an imminent raw materials crises. As prices rise in the traditional supply regions, currently inaccessible resources in Russia and North America will become available, coupled with the increasing utilisation of tropical forests. However, in considering tropical forest supplies, the availability of such wood is clouded by economic and political uncertainty. In the long term, it is possible that less developed nations rich in wood will come to

recognise the strategic economic value of their resources with the result that supply constraints similar to those imposed on crude oil utilisation could arise.

The Forwood Finance Panel (1974) examined the question of supplies from New Zealand. It concluded that these could not be relied upon by Australia to counteract the trend of rising world wood prices. There is no guarantee that wood products from New Zealand will be directed towards Australia at less than international market prices. In addition, constraints to increase low-cost production are beginning to arise with the location of new plantings in New Zealand on less favoured sites than previously. There is a growing concern towards the conversion of indigenous forest to plantations and land use conflicts are arising between forestry and farming.

3.7.2 Australia's Potential for Wood Production and Processing

The Forwood Finance Panel (1974) evaluated Australia's potential as an efficient producer of wood using both physical and financial criteria. It concluded:

Of those countries which might be in a position to supply softwood timber to Australia, there are very few having softwood growth rates in excess of those obtained in Australia. Eucalypt plantations have a high growth rate in many countries, including Australia, but for many uses the timber from these plantations does not usually provide an equally satisfactory substitute for softwoods.

Whether Australia is an efficient grower in terms of cost per unit volume is difficult to prove. There is very little published data on the cost of growing. When data is available, it is difficult to know what exchange rates to use to bring costs to a common currency. Australia does not encounter peculiar problems which would lead one to expect that on a unit area basis, our costs will be higher. Because of Australian high growth rates, one may expect our costs per unit volume to be less than in most other countries. In addition, our shorter rotations (40 years compared to 60 to 100 years in the Northern Hemisphere), the effect of interest charges should be less in Australia than in countries regarded as traditional exporters.

Relative processing costs are important to the question of comparative advantage. A likely advantage in growing is by itself, insufficient justification for an objective of a nett trade balance allowing for both imports and exports in forest products.

It is unlikely that in Australia, there is an overall comparative advantage in local processing of wood. The high concentration of relatively uniform material from plantations may be expected to lead to the general adoption of capital intensive production methods in both harvesting and subsequent processing. In the use of these methods, the more developed nations such as Australia have a demonstrated comparative advantage.

3.7.3 The Future Demand for Forest Products in Australia

The estimated consumption per capita is shown in Table 3.4.

TABLE 3.4 Estimated Consumption per capita

Product		Australia				
		1970	1980	1990	2000	2010
Sawn, natural round and hewn timbers						
Sawn timber	m^3	0.3339	0.3187	0.2950	0.2950	0.3071
Natural round timbers						
Poles piles posts pitprops	m^3	0.0518	0.0231	0.0177	0.0157	0.0142
Railway sleepers and other hewn timbers	m^3	0.0246	0.0160	0.0139	0.0118	0.0107
Totals		0.4103	0.3578	0.3266	0.3225	0.3320
Panel products						
Particleboard	m^3	0.0222	0.0484	0.0652	0.0781	0.0769
Plywood	m^3	0.0113	0.0126	0.0139	0.0154	0.0168
Hardboard	m^3	0.0093	0.0105	0.0109	0.0107	0.0104
Softboard	m^3	0.0025	0.0021	0.0018	0.0016	0.0015
Totals		0.0453	0.0736	0.0918	0.1058	0.1056
Paper and paperboard						
Newsprint	t	0.0381	0.0401	0.0450	0.0508	0.0569
Printing and writing	t	0.0194	0.0272	0.0355	0.0419	0.0441
Sanitary paper and tissues	t	0.0052	0.0095	0.0124	0.0157	0.0190
Packaging and industrial	t	0.0581	0.0748	0.0888	0.1031	0.1161
Totals		0.1208	0.1516	0.1817	0.2115	0.2361

(Source: Forwood, 1974)

Estimates of total domestic consumption together with export opportunities are shown in Table 3.5.

TABLE 3.5 Domestic Consumption of and Export Opportunities for Forest Products

	1970	1980	1990	2000	2010
Sawn timber, poles and posts					
1. Sawn timber (000's cu m)					
Domestic consumption	4 140	4 685	4 985	5 635	6 480
Export opportunities	33	40	40	40	40
2. Poles, posts etc. (000's cu m)					
Domestic consumption	642	340	300	300	300
Export opportunities	8	–	–	–	–
3. Sleepers (000's cu m)					
Domestic consumption	305	235	235	225	225
Export opportunities	19	35	35	35	35
Panel products (a)					
4. Particleboard (000's cu m)					
Domestic consumption	275	712	1 102	1 492	1 622
Export opportunities	4	10	10	10	10
5. Plywood (000's cu m)					
Domestic consumption	140	185	235	295	355
Export opportunities	1	1	10	100	100
6. Hardboard (000's cu m)					
Domestic consumption	115	155	185	205	220
Export opportunities	45	50	50	50	50
7. Softboard (000's cu m)					
Domestic consumption	31	31	31	31	31
Export opportunities	1	–	–	–	–
Paper and paperboard					
8. Newsprint (000's tonnes)					
Domestic consumption	472	590	760	970	1 200
Export opportunities	–	–	–	–	–
9. Printing and writing papers (000's tonnes)					
Domestic consumption	241	400	600	800	930
Export opportunities	16	28	32	36	44
10. Sanitary paper and tissues (000's tonnes)					
Domestic consumption	64	140	210	300	400
Export opportunities	4	7	8	9	11
11. Packaging and industrial paper (000's tonnes)					
Domestic consumption	720	1 100	1 500	1 970	2 450
Export opportunities	20	35	40	45	55
Export pulp and chips (000's cu m)					
12. Export opportunities (b)	–	5 000	8 000	8 000	8 000

(Source: Forwood, 1974)

- Nil or negligible

(a) Panel products estimates are shown in the Marketing Panel's report in square metres of specified thicknesses. In this table, they have all been converted to cubic metres.

(b) These figures are estimates of likely markets available having regard to the interaction between total market, likely availability of forest land, environmental restraints and economics.

1970 figures are actual exports.
(Derived from Tables in the FORWOOD Marketing Panel Report)

3.7.4 Supply Demand Balance

The Forwood Conference (1974) considered sawlogs and pulpwood separately. It was considered that native forests could not, in the planning period, sustain an increase in availability by adjusting management regimes. Plantations on the other hand respond more rapidly to changes in management regimes which can affect the availability of produce within the period. For this reason the plan was based on the adjustment of the management regimes of the plantation estate.

3.7.4.1 Existing Planting Programme

3.7.4.1.1 Sawlogs

The supply demand balance for sawlogs under the existing forest management regime and approved planting programme is set out in Table 3.6.

TABLE 3.6 Supply Demand Balance Sawlogs (Existing Regime) (in thousands cubic metres roundwood or roundwood equivalent)

	1980	1990	2000	2010
1. Demands for sawlogs (domestic only)				
Sawn timber	11 713	12 463	14 088	16 200
Plywood	463	588	738	888
Railway sleepers	588	588	563	563
Total	12 764	13 639	15 389	17 651
2. Supply of sawlogs Native forest only	6 593	5 411	4 575	4 438
3. Deficit to be met by plantations or imports (2-1)	6 171	8 228	10 814	13 213
4. Supply of plantation sawlogs From current regimes (Forest Resources Panel)	2 383	4 199	9 131	11 268
5. Import requirement If no additional planting or change of regime (3-4)	3 788	4 029	1 683	1 945

3.7.4.1.2 Pulpwood

In this section, the term "pulpwood" includes wood for particleboard, poles, piles, mining timber, fence posts as well as wood used for paper pulp, paper, paperboards and fibreboards.

Table 3.7 shows the pulpwood supply/demand comparison under the existing forest management regime and approved planting programme.

TABLE 3.7 Supply Demand Balance-Pulpwood (Existing Regime) (in thousands cubic metres roundwood or roundwood equivalent)

	1980	1990	2000	2010
1. Demand for pulpwood (domestic only)				
Poles and posts	340	300	300	300
Particleboard	1 068	1 653	2 238	2 433
Fibreboard	381	451	498	533
Newsprint	1 770	2 280	2 910	3 600
Printing and writing	1 672	2 508	3 344	3 887
Sanitary papers and tissues	630	945	1 350	1 800
Packaging and industrial papers	3 960	5 400	7 092	8 820
Total	9 821	13 537	17 732	21 373
2. Recycled waste paper				
For printing and writing papers	84	150	268	428
For sanitary papers and tissues	-	47	68	180
For packaging and industrial papers	1 980	2 970	3 901	4 851
Total	2 064	3 167	4 237	5 459
3. New material requirement (1-2)	7 757	10 370	13 495	15 914
4. Native forest roundwood availability				
Total Australian availability	8 926	8 922	8 757	8 610
Deduct volume not economically available for consumption in Australia (a)	3 183	3 163	3 026	3 026
Economic domestic availability	5 743	5 759	5 731	5 584
5. Native forest sawlog residue (b)	412	676	572	555
6. Deficit to be met by plantations or imports (3-(4-5))	1 602	3 935	7 192	9 775

TABLE 3.7 (Cont'd)

	1980	1990	2000	2010
7. Plantation roundwood availability (existing targets and regimes as per Forest Resources Panel Report)	2 339	4 849	5 789	6 068
8. Plantation sawlog residues (sawlog availability as per Forest Resources Panel Report)	477	1 050	2 739	3 944
9. Surplus pulp wood availability ((7 + 8)-6)	1 214	1 964	1 336	237

(Source: Forwood, 1974)

3.7.4.2 Proposed Planting Programme

The estimates of availability under 3.7.4.1 were based on projections compiled by the Forwood Resources Panel. In these projections the future supply calculations were based generally on a 50 year rotation. However if these plantations were to be managed on a 40 year or even shorter rotation, large volumes of wood from final fellings of the increased plantings carried out above the year 1970 would become available in 2010. It was considered desirable in this Plan to reduce the rotation age to a standard forty years.

The basic data for the planning of the future plantation programme is as follows:

- A mean annual increment of 16 cubic metres per hectare per annum has been adopted as this is the present weighted average for all commercial species planted on a significant scale. This m.a.i. is therefore the site quality yardstick and if significant areas of different site quality are established an adjustment in areas will be required.

- The estimated total wood requirement from plantations in the year 2010 to augment supplies from native forests is 23 million cubic metres. This consists of 13.2 million cubic metres of sawlogs (c.f. Table 3.6 item 3) and 9.8 million cubic metres of pulp material (c.f. Table 3.7 item 6).
- A normal plantation forest of 1.14 million hectares worked on a 40 year rotation would yield 18.2 million cubic metres of roundwood per annum. If 13.2 million of this is allocated to satisfy the sawlog deficiency, the remaining 5.0 million is available as roundwood for pulp material. In addition to this volume a further 4.6 million cubic metres (35% of the 13.2 million cubic metres of sawlog) is available as sawlog residues. The total pulpwood availability therefore becomes 9.7 million cubic metres in comparison with an estimated demand for 9.8 million cubic metres.

TABLE 3.8 Proposed Annual Planting Programme (a) (hectares)

Year	Replanting (2nd Rotation)	New Plantings (1st Rotation)	Total Plantings (b)
1975	5 400	23 100	28 500
1980	3 600	24 900	28 500
1985	2 400	26 100	28 500
1990	6 800	21 700	28 500
1995	8 900	19 600	28 500
2000	12 000	16 500	28 500
2005	20 100	8 400	28 500
2010	28 500	-	28 500

(Source: Forwood, 1974)

(a) To meet estimated requirements up to the year 2010
(b) Government plus private enterprise

3.7.4.3 Sawlogs-Proposed Regime

The sawlog supply/demand balance under the proposed regime is detailed in Table 3.9.

TABLE 3.9 Supply/Demand Balance - Sawlogs (Proposed Regime) (thousands cubic metres roundwood or roundwood equivalent)

	1980	1990	2000	2010
1. Demand for sawlogs (domestic only)	12 764	13 639	15 389	17 651
2. Supply of sawlog-native forest	6 593	5 411	4 575	4 438
3. Deficit (2-1)	6 171	8 228	10 814	13 213
4. Supply of plantation sawlogs	2 311	4 807	9 169	13 195
5. Import requirement (3-4)	3 860	3 421	1 645	18

(Source: Forwood, 1974)

3.7.4.4 Pulpwood-Proposed Regime

The altered management regime proposed to achieve self-sufficiency in sawlogs by the year 2000 affects only the coniferous plantation component of pulpwood availability so that the pulpwood supply/demand balance is altered as shown in Table 3.10.

TABLE 3.10 Supply/Demand Balance - Pulpwood (Proposed Regime) (thousands cubic metres roundwood or roundwood equivalent) (Source: Forwood, 1974)

	1980	1990	2000	2010
1. Demand for pulpwood	9 821	13 537	17 732	21 373
2. Plantation pulplog availability	2 086	4 082	3 706	5 045
3. Sawmill residues and recycled waste paper	2 938	5 045	7 560	10 632
4. Native forest pulplog availability	5 743	5 759	5 731	5 584
5. Surplus or deficit of available pulpwood ((2+3+4)-1)	+ 946	+1 349	- 735	- 112

3.7.5 Case for Farm Forestry

Examination of the forest resources supply/demand balance contained in the Production Forestry Development Plan shows that, without the development of additional production forests, there will be a continuing deficiency of forest produce. If the shortfall in supply is to be overcome, it will be necessary to establish additional plantations and also to extend the intensive management of some of the indigenous forests. Moreover, the export of wood chips from South Eastern Australia will have to be diverted by the year 2000 to pulp mills in Australia if Australia is to achieve self sufficiency in wood pulp at that time.

Due to the environmental pressures involved in clearing low yielding Eucalypt forest for softwood plantations, the case for farm forestry is strongest in areas where agricultural land is situated close to a processing plant and large forest resource base. Here the growing of trees with agricultural pursuits can be practised as a profitable venture.

In agricultural areas distant from a large resource base or conversion plant the physical difficulties of marketing, harvesting and transportation usually make farm forestry ventures unprofitable.

CHAPTER 4

REVIEW OF FARM FORESTRY IN AUSTRALIA

4.1 INTRODUCTION

The gathering of tree crops and the general practice of forest farming began in Australia long before the advent of European settlement.

4.2 THE DEVELOPMENT OF FARM FORESTRY PRACTICES

Seeds, nuts, fruits, bark, foliage and round wood from trees and shrubs have constituted important elements in the livelihood of the Australian aborigine. For generations, aborigines preserved the seeds of certain species of acacias, which were ground into meal or roasted.

Early reports by European settlers to Australia recall that the yearly burnings of the countryside by the aborigines kept the country in a state of open savannah. These fires were the measures adopted by the natives for removing old crops of grass. The new growth of grass afforded a nourishing and tempting food for the kangaroos and emus.

These practices, until recent times, were continued by graziers in certain areas; such as the Snowy Mountains; to provide a food source for their sheep and cattle. This practice of winter burning was most effective in reducing fire hazards in these areas and maintaining the open savannah countryside.

The gradual exclusion of the aborigines from the better land areas through the efforts of the European settlers, led to

the replacement of large areas of savannah woodlands with open farmland. These areas are now used for conventional agricultural practices such as cereal production and livestock husbandary.

Little or no forest farming was practised in Australia by the European settlers, although isolated examples can be found. One example is the grazing of shrub-steppe areas dominated by various annual and perennial species of the family Cheropodiaceae (saltbush).

Other trees and shrubs which are grazed or fed as forage for stock include Brachychitons (Kurrajongs); Eucalyptus angulosa (mallee) and Acacias such as A. aneura (mulga).

4.3 CURRENT FARM FORESTRY PRACTICES IN AUSTRALIA

The use of forest materials for agricultural purposes include the provision of fencing materials, the provision of minor forest products as charcoal, essential oils and tanning materials, honey production and fuel wood production and industrial wood production.

4.3.1 Production of Fencing Material

In the rural sector, the predominant use of the forests for agricultural pursuits has been for the provision of fencing materials. Although reported annual removals of industrial hardwood log timber for fencing material amounts to some 200,000 cubic metres or 2 percent of total removals, the figure is probably much higher (Hall, 1970). The total useage is probably 4 to 5 percent since a large amount of timber grown and used on the same farm would not enter the statistics.

There is an increasing usage of preservative treated softwood for fence material. However, the price differential between softwood and hardwood posts, still makes hardwood posts the more attractive proposition in the immediate future.

The capital investment represented by fencing varies from only one to two percent of total capital invested on very large cattle stations, to as high as 25 to 50 percent on smaller scale operations in the higher rainfall and more intensively used areas (Hall, 1970).

Until recently, the material for fence posts was obtained from timber felled or large scale clearing for agricultural development. Some material would come from forest reserves.

With the exhaustion of the plentiful supplies of fencing materials on farms, many farmers are now retaining a small area of forest specifically to supply fencing material.

In consequence, a form of management aimed at the production of fencing material is being practised. However, normally these regimes do not have any silvicultural basis and often result in the larger trees being left because too much work is involved in felling and splitting them.

4.3.2 Provision of Minor Forest Products

From the early Nineteenth Century to the present time, European settlers have to varying degrees farmed the forests for the production of tool handles, wheels, axles and minor forest products. Today, the minor forest products most readily sought include products as essential oils, tanning materials, honey and charcoal.

Table 4.1 depicts the major useage of minor forest products in Australia.

4.3.3 Honey Production

Australia produces between 35 to 40 million pounds of honey and 0.5 to 0.7 million pounds of beeswax annually. At October, 1972, the gross value of honey produced was between 4 and 5 million dollars and for beeswax was between 0.25 and 0.5 million dollars (Hall et al, 1972).

The ability of apiarists to successfully harvest honey and beeswax depends, both on the management of their hives and the availability of adequate supplies of nectar and pollen at appropriate periods.

4.3.4 Fuel Wood Production

In many countries, forest areas are managed for fuel wood production. Whilst wood fuel has been used extensively in the past and still in remote areas of Australia for heating and cooking needs, its collection has usually been of a destructive nature following the path of large scale clearing for agricultural development. Specific management regimes for the production of fuel wood have not been practised. This has resulted in complete removal of the forest cover in many areas.

4.3.5 Wood Production

Farm forestry practices in Australia today (excluding horticultural activities) comprise mainly the use of trees for ornamental, stock shelter, shade and forage and timber production.

TABLE 4.1 Minor Forest Products, Recorded Production - Australia

	Unit	1938-39	1946-47	1959-60	1964-65	1965-66	1966-67	1967-68*
Aromatic wood -								
Rosewood(a)	tons	194	221	11	-	-	-	-
Sandalwood(b)	"	347	1,668	610	812	1,040	741	775
Charcoal -								
Forest charcoal(a)	tons	1,897	3,596	1,182	8,740	40,408	48,169	41,036
Industrial charcoal(c)	"	-	-	38,783	41,848			
Essential oils, etc. -								
Eucalyptus oils	lb	807,903	1,384,475	913,187	545,536	471,977	420,447	370,717
Duboisia leaf (a)	"	-	-	210,747	1,500,000	1,425,500	1,400,000	1,397,536
Foliage for rutin(a)	"	-	-	26,726	101,694	1,577,310	1,042,540	...
Tea tree oil	"	7,209	16,092	18,135	8,120	5,084	4,251	3,507
Boronia blossom	"	1,876	328	2,198	1,275	2,763	4,322	4,223
Sandalwood oil	"	...	...	...	...	7,658	3,995	3,561
Tanning materials -								
Tanbark	tons	3,279	2,735	5,076	3,049	2,835	2,208	...
Wandoo for tanning	"	29,988	65,077	46,566	43,775	44,210	45,008	43,766
Miscellaneous -								
Canes and rattans(a)	"	...	19,063	20	1	7	4	5
Mulga wood(a)	"	20	97	30	96	50	86	...
Gums and resins (a)	"	2,247	1,252	534	978	1,324	381	...
Honey	000's lb	...	...	...	...	36,200	31,800	39,700
Beeswax	"	...	...	...	...	494	467	429

(Source: Use of trees and shrubs in dry country of Australia, p.259, Table 13.2, 1972).

* Provisional ... Not available - Nil or negligible

(a) Incomplete. Crown Land only figure in at least one State

(b) Includes roots and butts for oil

(c) Produced by Wundowie, W.A. for Charcoal Iron & Steel Industry (commenced 1948).

The area of privately owned productive or potentially productive forested land has been estimated to be 9 million hectares or approximately 21 percent of the total forest area. It therefore constitutes a significant proportion of the national forest estate, falling into two main components.

4.3.5.1 Native Forest Resource

The privately owned native forests are, for the greater part, unmanaged. They include residual forest areas (which provide fencing materials, stock shade and shelter) which have remained following the conversion of surrounding areas to agriculture and other uses. However, not withstanding their generally unmanaged condition, these forests continue to provide a significant although decreasing proportion of the hardwood timber for Australian wood-using industries.

4.3.5.2 Plantation Resource

McKenzie Smith (1975) defined individual private ownership as plantations established by private landowners with the objective including long term investment, beautification, stock shelter, weed control or erosion control.

Table 4.2 shows the areas of farm forests in relation to other forms of forest ownership as at March 1972.

TABLE 4.2 Coniferous Plantation Areas (hectares - net) at 31 March 1972 by State & Ownership Categories

	Farm Forests	Industrial Companies	Investment Companies	Total Private	Communal (c)	Govt.	Total Coniferous Pltn. Area
Queensland	1,900	16,100	1,000	19,000	-	76,700	95,700
New South Wales (d)	200	-	14,900	15,000	600	85,600	101,300
Australian Capital Territory	-	-	-	-	-	12,700	12,700
Victoria	2,400	37,500	6,600	46,500	3,500	50,100	100,100
Tasmania	400	7,200	-	7,600	200	18,600	26,400
South Australia	1,400	7,300	7,900	16,600	1,000	68,700	86,300
Western Australia	-	800	1,700	2,500	-	30,100	32,600
Northern Territory	-	-	-	-	-	1,500	1,500
TOTAL	6,300	68,900	32,100	107,300	5,300	344,000	456,600
% Private Sector	6%	64%	30%	100%	-	-	-
% of Total	2%	15%	7%	24%	10%	75%	100%

(Source: Finance Panel, Forwood, 1974)

(c) Communal - owned by local government authorities, city councils, schools etc.
(d) N.S.W. - farm forests less 40 ha not been included
\- Nil or negligible

4.4 PROBLEMS FACING FARM FORESTRY

The current incentive schemes have still not encouraged widespread acceptance of farm woodlot schemes in Australia.

The main factors which have restricted its development are:-

4.4.1 The limited amount of finance which the public authorities can make available for farm woodlot and farm extension schemes.

4.4.2 The lack of knowledge on farm forestry practices by the rural communities.

4.4.3 The long waiting period (usually) before revenue is produced.

4.4.4 Even if the former is aware of farm forestry practices and capable of managing an integrated system, he still has the problems of selecting which species to plant and the loss of productive agricultural capacity during the period the tree needs to come to financial maturity.

4.4.5 The lack of ready markets for forest produce.

4.4.6 Conflicting views on land use policies from different groups in society make it extremely difficult for policy makers and politicians to offer appropriate incentives for farm forestry practices without losing electoral support.

Without proper policy direction through farm planning and extension services, isolated woodland plantings could lead to fragmentation of the resource and create severe marketing problems in the future.

4.4.7 The greatest single deterrent to the expansion of farm forestry has been the low price paid to the growers of saleable wood.

Watt (1975) in his discussion of this problem, suggested that when a stumpage system was adopted which allows standing timber to be sold at artificially low market prices, it gave a short term advantage to industry through higher profitability, but it was likely to severely reduce the forest base available to industry in the longer term.

4.4.8 A major problem faced by farm forestry is the availability of capital. Gardner (1968) discussed the availability of capital from various sources within the financial sector. The following section shows that these sources are unsuitable for farm forestry ventures because of the peculiarity of the woodlot cash flow.

Hire Purchase Finance

Hire Purchase finance is unsuitable because of the following factors:

(1) the interest rate is high (up to 18%);

(2) it is usually available only for a short time span, usually 2 to 4 years;

(3) once the loan agreement is signed, repayments commence immediately;

(4) it is not feasible to have a co-operative effort between neighbours with one hire purchase agreement being effected.

Trading Bank Sources

Funds from trading banks suffer the following disadvantages:-

(1) co-operative borrowing is not acceptable, so that loans are issued in the names of individuals only;

(2) the time period for funding is directed towards the short-medium term borrower for terms not greater than ten years at ruling bank borrowing rates. This time period does not suit forestry investment requirements;

(3) repayments of the capital may be rebated for two years but interest payments must be commenced within the first year.

Development Bank Sources

The Commonwealth Development Bank was specifically set up to cover avenues of development which are unable to attract financial support through the normal channels. Disadvantages include:-

(1) co-operative borrowing is not acceptable due to legal difficulties;

(2) funds must not be otherwise available;

(3) progressive release of funds to allow year by year planting is not acceptable with the exception of an initial two year period;

(4) there is not interest repayment rebate at all although principal repayment requirements may be delayed for two years, as in the case of Trading Bank Finance.

In considering Trading and Development Bank finance, it would be necessary to have some other form of income available to make the interest and capital repayments before any income can be expected from the plantation. This necessarily involves owners in using income from other farm sources for this repayment.

Trading and Development Bank finance could be made available but only where tree growing is part of the overall farm activity and on the understanding that their consideration would extend to the forest operation as a whole.

CHAPTER 5

DEFINITION OF FARM FORESTRY

5.1 THE CURRENT AGRICULTURAL SCENE IN AUSTRALIA

The current agricultural scene in Australia concentrates mainly on cereal growing and on conventional livestock rearing. Cereals such as wheat, barley, millet, maize and rice, as well as annual leguminous crops such as peas, demand annual cultivations which are expensive in labour and machinery, and require large inputs of water and fertiliser. They are extremely vulnerable to the vagaries of the weather. Harvest failures, due to drought, flood, or fire can lead to economic disaster and even starvation in the affected areas.

Livestock rearing in its traditional form, dependent on a limited range of grass and clover species and often carried out on low grade pasture, can be an extremely unproductive form of food production. It can also be disasterous when areas are overgrazed or subject to flood, fire or drought.

The extension of agricultural activities into areas of poor soil and little rainfall can through poor agricultural management lead to degeneration of these areas into desert.

5.2 ADVANTAGES OF TREE CROPPING

Douglas and A de J Hart (1976) report that in the light of the conspicuous failure of conventional agriculture to fulfil the nutritional needs of the world's rapidly growing population,

far sighted agronomists in many countries are turning their attention to the numerous advantages of tree crops.

Trees offer the possibility of far higher food yields per acre. Livestock rearing in the temperate regions produce approximately two hundred and fifty kilograms per hectare and cereal approximately four tonnes per hectare; apple trees can yield more than seventeen tonnes per hectare while Gleditsia triacanthas (honey locust) can provide fifteen to twenty tonnes of cereal equivalent per hectare. In tropical regions, there is the possibility of even higher yields if multiple cropping of trees with vines, vegetables or cereals is practised.

Trees can tolerate harsh environments which would be unsatisfactory for most other forms of food production.

Until quite recently, forestry was excluded from farming and silviculture was regarded by agricultural scientists as a separate technique, having no possible relevance to food production. Fruit production was allocated to the horticultural sphere. There were few contacts at scientific level between foresters and agricultural scientists and virtually none in the technical or practical fields.

5.3 CONCEPTS OF FARM FORESTRY

5.3.1 Hall and Brown's Concept

In the past, farm forestry in Australia has followed the definition of Hall and Brown (1969).

They defined farm forestry as the use of trees for ornamental, livestock shade and shelter and timber production in rural areas.

Applying this concept of farm forestry has only been partially successful. The problems associated with this concept are:

5.3.1.1 The reluctance of the rural sector to include trees in farm planning.

5.3.1.2 The segregation of food production and forest production as two separate entities.

5.3.1.3 No economic basis for growing trees.

5.3.2 Tustin and Knowles Concept

In New Zealand, the concept of farm forestry has gained wider acceptance in the rural sector due to the integrated production of foodstuffs and forest products. Tustin and Knowles (1975) define farm forestry as any situation where trees and grazed pasture are grown together in an integrated management system, the prime object being to increase the long term net profit per hectare.

The main criterion in New Zealand is profit maximisation using tree crops on pastured land or vice versa.

In attempting to apply Tustin's and Knowle's definition to Australian conditions, one would face the following problems:

(1) In many areas of Australia, the main source of forage for livestock is made up of shrubs (for example, saltbush), not pasture species in the agricultural sense.

(2) The definition is limited to those areas with good rainfall and soil types where pasture and trees can be grown in conjunction.

5.3.3 Sholto Douglas and A. de J. Hart Concept of Farm Forestry

Sholto Douglas and A. de J. Hart (1976) define the aim of farm forestry as to increase and diversify the productive capacity of woodlands or pasture land such that the output should include forest products, and a wide range of foodstuffs.

They consider the following three principles as fundamental to the success of a forest farm:

(1) The species chosen, should be suitable to the local habitat, allowing for progressive development designed to ameliorate unfavourable conditions.

(2) The whole unit or series of units must be capable of achieving a harmonious and balanced output.

(3) There must be an economic basis for growing trees.

It can be seen that Tustin's et al. definition is an application of Douglas' et al. definition to a specific management regime.

5.3.4 Definition of Farm Forestry for Australian Conditions

The Sholto Douglas et al. definition of farm forestry lends itself to the Australian diversity of ecosystems and agricultural systems.

It considers plant culture and livestock rearing as components of one whole biological cycle with each portion as a

progressing entity. Overall, there must be an economic basis for growing trees in order to increase the long term nett profit per hectare.

In this essay, the concept of farm forestry is defined as those measures which increase and diversify the productive capacity of woodland or pasture land, in order to increase the long term nett profit per hectare.

CHAPTER 6

METHODS OF EVALUATING PROFITABILITY

6.1 INTRODUCTION

Three areas must be examined when doing comparative analyses of afforestation and agricultural activities.

The three areas are:

(1) The optimum use of land;

(2) The chcice of methodology by reference to which financial calculations will be made;

(3) The choice of criteria by which the relative merits of the alternative activities will be assessed.

6.2 THE OPTIMUM USE OF LAND

The question of the optimum use of land was discussed by Ward (1963). Ward considered that in terms of economic efficiency, the optimal use of land occurs when it is allocated amongst competing uses such that the total nett output is maximised. This ensures the most productive combination of land and other inputs. Ward points out that this is achieved when the value of the nett output of the marginal hectare is the same in all uses. The residual value of the land can readily be calculated as the difference between discounted benefits and costs of the co-operating factors. Because of the problems of valuation, Ward ignores the possibility that this residual may not equal the true nett output or marginal product.

The concept of discounted nett returns as an infinite time horizon has been used as a measure of the efficiency of land use at least since Faustmann proposed his concept of the "land expectation value" in 1848. Faustmann's land expectation value is the same concept as the economic rent defined by Leftwich (1961).

6.3 CHOICE OF METHODOLOGY

Much work has been carried out by the Bureau of Agricultural Economics, Canberra (1973) on the choice of methodology for comparative analyses of agriculture and forestry alternatives.

In a comparative analysis of afforestation and agriculture, it is necessary to deal with a time period, at least equal to that of one forest rotation. Agricultural activities must be stimulated as occurring over periods of time equal to those involved in forest rotations.

Since both the nature and timing of inputs and outputs vary, for the sake of comparison, they are usually expressed in terms of the common denominator, present worth.

Because of the long period between the outlay of capital and the receipt of the major yield in forestry, the present value calculations will be particularly sensitive to the rate of discount used. Low rates of discount will tend to favour afforestration, whereas a high discount rate will tend to make agriculture more attractive.

As the choice of a discount rate is largely a value judgement and as it may be critical in any comparison of afforestation and agriculture, it is considered that an appropriate range of rates be used.

Changes in the discount rate may or may not cause a reversal of indicated land use.

The need to discount future cash flows to present values having been accepted, and assuming a monetary assessment of a nett benefit stream, a final decision criterion must be selected.

6.4 THE CHOICE OF CRITERIA

6.4.1 Nett Present Value

A nett present value calculation commonly used in forestry appraisal is that given by the Faustmann Formula.

It could be used for comparing the claims of forestry to relatively small areas of land which are already developed and in agricultural use. This approach was discussed by Ward (1963). This formula yields a land expectation value which is the capitalised nett output of land under forestry. It represents the maximum price that could be paid for land for the project to break even.

The particular form of the Faustmann formula proposed discounts all costs and returns for one rotation to their present values and then considers an infinite series of rotations assuming a constant timber yield.

$$L_f = \frac{Y\,n + \sum_a Ta\,(1+r)^{n-a} - \sum_b P_b\,(1+r)^{n-b} - C(1+r)^n}{(1+r)^n - 1} - \frac{e}{r}$$

where L_f is the land expectation value for forestry

Y_r is the standing value of timber in year $\underline{n}$

$\underline{n}$ is the length of rotation.

Ta is the value of thinnings during rotation

a represents the years of thinning

P_b is the costs of pruning during rotation

b is the year of pruning

C is the cost of establishment

e is the annual cost of management

r is the discount rate

An equivalent land expectation value for agriculture can be calculated assuming an infinite production period with constant yields.

$$La = \frac{i - c}{r}$$

La is the land expectation value for agriculture

i is the annual gross output

c is the annual cost

r is the rate of discount.

As the aim of the comparison is to establish the relative merits of agricultural or forestry use, their land values need not enter the calculations.

The characteristics of the land expectation value are:-

(a) it assumes all economic surplus accrues to land, constant site productivity, constant interest rates and relative prices and costs;

(b) it will be different for each different rate of discount used.

Where multiple use is made of land, (in reference to where agriculture and forestry are complementary activities at the farm

level) the land expectation value is not an appropriate measure of profitability unless the farm is considered as a whole.

The major shortcoming of the nett percent value method however is that it fails to indicate the return to capital. Where capital is limited, it is necessary to have some measure of the nett discounted revenue per unit of capital. This criterion is met by the benefit cost ratio.

6.4.2 Benefit Cost Ratio

Where there are budgetary constraints, it is useful to calculate the benefit/cost ratio in addition to the nett present value even though the benefit/cost ratio does not necessarily rank investments in the same order as the nett present value criterion.

The benefit/cost ratio gives no indication of the total value of the investment and is also sensitive to the discount rate chosen.

To overcome the problems associated with a subjectively chosen discount rate, the internal rate of return method is sometimes advocated.

6.4.3 Internal Rate of Return (IRR)

The I.R.R. is the discount rate which equates the present value of nett benefits to investment costs. It is useful for illustrative purposes but can be misleading as a criterion for deciding between alternative investments.

The major shortcoming of the I.R.R. method is that, like the benefit/cost ratio, it gives no indication of the total value of

the investment. Other difficulties are that the I.R.R. may not consistently rank alternative investments where the nett present value curves (Nett present value plotted against discount rate) intersect. In addition, an intrinsic assumption of the I.R.R. calculation is that the opportunity cost of capital is the I.R.R. itself. There appears to be no justification for this assumption.

6.4.4 Risk and Uncertainty

Ranking in terms of nett present value or benfit/cost ratio is valid only in the absence of risk and uncertainty.

The expected nett present value can be considered as only one value in a range of possible nett present value estimates.

A sensitivity and risk analysis allowing for variation in the key parameters is an essential part of the analysis.

6.5 VALUE TO THE NATION AND TO THE INDIVIDUAL

Costs to the nation in developing a block of land are different from those faced by individuals. The individual must assess returns after paying tax. From the national point of view, taxation is a transfer payment and not a cost. Producer subsidies (such as freight concessions, fertiliser subsidies, concessional interest rates on farm development loans) lower individual producer's costs but do not lower costs to the nation.

In discussing nett present value and benefit/cost ratio criteria, it has been assumed that costs and benefits are expressed as costs and benefits to the nation. At the farm level however,

decisions are usually based on the individual's viewpoint and transfer payments such as taxation and subsidies are relevant components in the analysis.

The opportunity cost of capital for the individual will usually be different to the opportunity cost of capital to the nation. The discount rate used in each case should reflect the opportunity cost of capital.

Where forestry and agriculture are complementary farm activities, linear programming is the most appropriate technique in deciding the optimum combination of enterprises. Linear programming requires the calculation of the gross margin for each activity. The gross margin is merely the difference between total returns and variable costs and is usually expressed in dollars per unit area per year.

Because forest rotations extend over more than one year, it is necessary to convert the financial yield from forestry to an annual equivalent.

The linear programming technique indicates the sensitivity of optimal plans to changes in gross margins.

CHAPTER 7

REVIEW OF AUSTRALIAN STUDIES

Treloar and Morrison (1962) carried out economic comparisons of forestry and agriculture in the hardwood/butterfat region of South Western Australia. Their report consisted of 3 studies of the comparative economics of agriculture and forestry where they compete directly for resources. The need arose for these comparisons because the resources were scarce and the use of those resources was a contentious issue and the relative merits of the alternative forms of land use would not have been otherwise evident.

The profitability of butterfat, the main agricultural product in each area was so low that there had to be either an improvement in its efficiency or a re-employment of resources into forestry.

A forestry infrastructure already existed in the South West of Western Australia so that both marginal and large scale adjustments were feasible.

Table 7.1 shows the internal rates of return obtained for the three areas.

The report showed that in the case of the Blackwood Valley, the forest service could continue to purchase farm land and still obtain rates of return of 10%. In the Chapman Forest, it was clearly preferable to leave the land under Jarrah forest. In the Hovet area the purchase of farmland for conversion to P. pinaster plantations was slightly less profitable than maintaining the existing average farm.

TABLE 7.1 Internal Rates of Return for Forestry and Agriculture

Area	Blackwood Valley	Chapman Forest	Horst
Comparison	Existing agriculture versus purchase of farmland for radiata pine (16,000 acres already purchased)	Clean Jarrah for farming or manage Jarrah for wood products.	Purchase of(1) farmland for pinaster forests
Farming	6 to 8%	6%	6% (2)
Forestry	10%	15%	5.5%

(Source: Treloar and Morrison, 1962)

(1) Forestry costs include purchase of farmland at market values.
(2) Average existing farming returns.

Sinden and Kingma (1971) discussed a comparision of forestry and agriculture using a summary of relevant Australian studies. This summary is shown in Table 7.2.

They discuss the comparision in terms of land expectation values. (This value is the highest amount that forestry can afford to pay for a hectare of land with the given labour costs and discount rates. An analogous use of the concept is to calculate the internal rate of return when the purchase price of land is included at current market rates).

Sinden and Kingma included both interpretations in comparative studies of profitability. The information seeks to answer the question, under what conditions can state forestry compete for agricultural land? The information is summarised in terms of the unsubsidised nett return to capital for agricultural and the internal rate of return and land purchase price for forestry.

TABLE 7.2 The Efficiency of Existing Farming and the Expansion of Forestry (1)

Region	Farming(2) Net Return to Total Capital %	IRR (a) %	Land Purchase Allow-ance $	Species	State(S) or Private (P)	Market Price of Farmland (MPF) Location and other notes	Reference	Opport-unity Rating (3)
High Rainfall Sheep Zone								
NSW – Orange	4.5	5.0	101	Radiata Pine	S	None	Lugton 1968	*
– Oberon		5.0	100	" "	S	Local Agr. rather better than ave.	Muir 1964	
– Nowendoc		5.0	130	" "	S	" " "	Hoy & Sinden 1968	
S.A.		5.0	225	" "	S	Volcanic soils, mpf $225	Lewis 1967	*
	3.5	5.0	350	" "	S	Deep terra rossa soils mpf $100	Lewis 1967	**
Irrigation Upper Murray	4.3	5.0	62 (4)	Poplar	S	Cobram, Victoria. applies to both regions	Nicholls 1969	*
Mid Murray	-2.4							
Horticultural Bananas NSW	-5.9	5.0	7	Flooded Gum	P		Sinden 1970	
and Qld		4.0	5	"	S			
Dairying	-0.4	7.0		Carribean Pine	S	Atherton, expansion on to de-graded farmland mpf $25	Gilmour & Reilly 1970	**
Qld Cairns	-10.1	9 to 12	350	Poplar	P	Best flood plain sites	Sinden 1970	**
NSW Nth Coast		7.0	350	Poplar	P	Poorer sites	Sinden 1970	**
Sth Coast	4.4	5.0	350(5)	Pinus radiata	P	Sites near market	Walsh 1968	*
Southern Table-lands	4.4	4.5	75(6)	Pinus radiata	P	Sites distant from market	Walsh 1968	
S.A. Southeast	1.3	5.0	75	Pinus radiata	S	Shallow terra rossa mpf $100	Lewis 1967	
		5.0	350	Pinus radiata	S	Dune margins up to $350 mpf $100	Lewis 1967	
		5.0	225	Pinus radiata	S	Volcanics mpf $225	Lewis 1967	
				Pinus radiata	S	Not suitable mpf $175	Lewis 1967	
W.A.	6 to 8(7)	5		Pinaster pine	S	Includes market price for land purchase	Treloar and Morrisson 1962	**
		10		Radiata pine	S			
Pastoral Zone	There are no forestry opportunities							
Wheat Sheep	Opportunities limited to cypress pine							

(Source: Sinden and Kingma, 1971)

NOTES TO TABLE 7.2

(1) With a constant series of cash flows, the farming net return is conceptionally comparable with forestry's internal rate of return. Also both are percentage returns rather than net returns.

(2) Davidson, B.R. 1967. The comparative profitability and efficiency of agriculture in different regions of Australia. Review of Marketing and Agricultural Economics, Vol. 35(4), pp.179 to 206.

(3) Two stars denote a definite opportunity where land can be purchased at market price and the projects still have an internal rate of return of 7 percent. A one star rating denotes a 5% IRR with market purchase price.

(4) At five percent the land expectation value is $81 with an allowance of $60 for land purchase and $64 for land clearing, cultivation fencing and pasture which is now unnecessary. The state expenditure of $143 per acre for the capital works of irrigation which must be deducted. The maximum that could be paid for land is therefore $62 (205-143).

(5) A land purchase and clearing cost of $75 and a land expectation value of $275 at five percent. The total allowance for cleared farmland is therefore $350.

(6) A land purchase and clearing cost of $75 and a land expectation value of $0 at 4.5 percent.

(7) Estimate from Treloar and Morrisson.

(a) Internal Rate of return.

The comparison of existing farming and forest expansion opportunities exhibits an overall trend. Many of the dairying areas have large numbers of low income farmers and in general, provide encouraging opportunities for forest expansion. In two study locations, the state forest service can afford to pay the market price for land and earn an internal rate of return of seven percent. Two private forestry enterprises with lower overheads, showed similar results.

MrCarthy, Nuthall, Higham and Ferguson (1970) carried out an economic appraisal of alternative possibilities for land use of the South Wallum Area of Queensland. Their appraisal indicated that a forty year slash pine rotation may be more profitable than beef cattle raising enterprises from the national point of view.

The study compared three cattle enterprises (two breeding and one fattening) with two forestry enterprises (a twenty year slash pine rotation for pulp and a forty year slash pine rotation for pulp and sawlogs). Under the assumptions used, the forty year forestry rotation was the most profitable alternative.

A summary of the results is shown in Table 7.3. The discount rate used was 6%.

All studies on the economic comparisons of forestry and agriculture carried out in Australia are from the national viewpoint. No study examines farm forestry and looks at its problems and potentials. Much work needs to be done in this area if policy makers, investors and rural land owners are willing to consider farm forestry ventures, profitable forms of investment.

TABLE 7.3 Economic Criteria for Slash Pine Forestry and Beef Production for the South Wallum

Enterprise	Nett Present Value ($million)	Benefit/ Cost Ratio	IRR %	Land Expectation Value ($per acre)
Beef Fattening	- 1.2	1.0	5.9	-2
Beef Breeding (purchased 2 year old breeders)	43.7	1.1	7.6	59
Beef Breeding (own breeding herd)	-36.7	0.9	4.6	-50
40 year pulp and sawlog rotation	61.7	2.0	8.6	84
20 year pulp rotation	- 6.3	0.9	5.5	-9

(Source: McCarthy et al, 1970)

CHAPTER 8

EXISTING MEASURES OF ASSISTANCE TO THE AGRICULTURAL SECTOR

8.1 INTRODUCTION

There are a variety of government measures which, in some degree, intervene in the normal working of the rural sector of the economy.

The various measures of assistance are classified partly on the basis of objectives they are trying to achieve and partly according to the method of achieving that assistance.

8.2 MEASURES TO IMPROVE INDUSTRY EFFICIENCY

These include expenditure on research (technical and marketing of produce); extension activities and disease control and quarantine expenditure and reconstruction schemes.

In 1972-73, these measures accounted for over 30% ($133.8 million) of Australian Government assistance to agriculture with reconstruction and research funds being the major components of this expenditure (Report of the Auditor General 1972/73).

8.3 EXPENDITURE ON INFRA STRUCTURE INVESTMENTS

This includes expenditure on irrigation and water supply projects, beef cattle roads and brigalow land development. In 1972-73, these expenditures accounted for approximately 6% ($23 million) of the total Australian Government's rural appropriations, a proportion which has gradually diminished over the last three to four years (Auditor General 1972/73).

8.4 CONCESSIONS COMPENSATING FOR DISABILITIES

These include:

(a) the averaging provisions in the income tax legislation removing a disability farmers otherwise incur as a result of highly fluctuating incomes;

(b) drought relief payments;

(c) devaluation compensation payments.

These payments were made to various farm groups after the British devaluation and the resultant reduction in the returns received by Australian rural exporters.

Total Government assistance is highly variable, ranging from 25 percent ($67 million) of total rural assistance between 1967 to 1971 to 9 percent ($31 million) in 1972-73. (Auditor General, 1972/73).

8.5 ASSISTANCE TO RURAL MARKETING AGENCIES

This includes expenses of various Commonwealth marketing boards, advances of working capital to the Australian Wool Commission and grants to canning factories. Expenditure is small and accounts for 1 to 2 percent($2.3 million) of total assistance to rural industry (Auditor General, 1972/73).

8.6 DIRECT FINANCIAL ASSISTANCE TO PRODUCERS

Three different types of assistance are evident.

(1) Direct Government financial support for stabilisation schemes for products such as wheat, dried vine fruits, apples and pears.

(2) Bounties on butter, cheese, other dairy products and cotton which have now been discontinued or are being phased out.

(3) Emergency Assistance granted to woolgrowers in 1970-71 and 1971-72 when wool prices were at extremely low levels.

Total direct assistance represents around 30 percent ($71.2 million) of total Government grants to the agricultural industries (Auditor General, 1972/73).

8.7 INPUT SUBSIDIES

Subsidies to reduce the price of both phosphate and nitrogenous fertilisers have been in operation since 1963 and 1966 respectively. The costs of these subsidies have gradually risen to reach some $70 million in 1972-73 or 23 percent of the total assistance to rural industries.

Initially, both subsidies were designed to encourage producers to use more fertilisers. More recently, their contributions as a means of reducing farm costs have tended to be stressed by their defenders.

8.8 OTHER MEASURES

These include a range of tax concessions to rural producers, including investment allowances, accelerated depreciation allowances, concessions on estate duty and the deductibility of certain types of capital expenditure.

The financial costs of these concessions to consolidated revenue have been $30 to $40 million per annum in the last five years. However $20 to $30 million of this amount was provided as interest free loans which implies a lower level of tax deduction in later years.

CHAPTER 9

EXISTING MEASURES OF ASSISTANCE TO THE FORESTRY SECTOR

State Forestry is to some extent accommodated by the provision of Federal Government loans on generous terms appropriate to forestry needs.

Private forestry in comparison incurs the extra costs of the various taxes and local government rates not borne by the State Government Forestry Services.

Private forestry is further disadvantaged because it cannot recover its costs through the selling price which is dominated by the State Government Forestry Agencies. Consequently their royalty rates set the effective maximum selling price. These aspects also limit the ability of the forestry sector to finance forest expansion from internal sources.

The forms of assistance currently available to the private forestry sector include: the ranking of forestry as a form of primary production for taxation purposes and the provision of farm woodlot schemes and industry incentives. These are examined in detail below.

9.1 FORESTRY AS A FORM OF PRIMARY PRODUCTION FOR TAXATION PURPOSES

As expenditure on afforestation is now classified as a form of primary production for taxation purposes, the costs of establishment and maintenance of a pine crop are now allowable deductions in the year they occur. In addition, losses which are incurred in any year may be carried forward indefinitely.

The conferring of primary production status to forest operations for income tax purposes resulted from the recommendations of a report by a Federal Committee on taxation ("Ligertwood Committee") appointed by the Australian Government 1959.

Production resulting directly from forest operations became primary production by virtue of the new definition of primary production given in Section 6(1) of the Income Assessment Act. This provision became law after being passed as an amendment of the Assessment Act in 1963.

The significant provisions of the Asssment Act which apply exclusively to primary producers include:

(1) averaging of revenues (individuals only);

(2) special depreciation allowances;

(3) deductions for specified capital expenditure;

(4) investment allowances for primary producers (Section 62A B).

The Department of National Development (Forest and Timber Bureau, 1967) in leaflet 111, outlined some of the effects of the taxation concessions provided by the Australian Government in 1967.

Co-operative companies in Australia are regarded in general terms as a public company if they meet tests prescribed in Section 103A of the Assessment Act. To qualify for special deductions from assessable income that are allowed to co-operative companies, certain requirements specified in Sections 117 and 118 of the Act must be met.

A co-operative company is permitted to deduct from its income, rebates, interests and dividends paid to shareholders. They are also exempt from the tax on undistributed profits.

Many expenditures of a capital nature on the preparation of land for forestry enterprises are allowable deductions within the limits specified by sections 75 and 76 of the assessment act.

These include:

(a) eradication or extermination of animal and vegetable pests from the land;

(b) destruction or removal of timber, scrub or undergrowth indigenous to the land;

(c) preparation of land for forest operations, this includes ploughing and pasture establishment;

(d) drainage of swamps and low lying ground where that operation improves the forestry value of the land;

(e) the preparation and eradication of soil erosion;

(f) the construction of dams for conserving water for use in carrying on primary production on that land;

(g) purchase of materials such as pipes for carrying water, fencing material (the total capital outlay for fencing material and labour for fence erection are allowable deductions;

(h) the raising of seedlings and planting of trees.

The purchase of land for forestry enterprises (capital outlay) is however not deductible from assessable income.

Chandler (1970) in his discussion of the taxation concessions provided by the Commonwealth Government in 1967, indicated that although the costs associated with establishing and maintaining plantations are partly offset by taxation concessions, they only become significant if the plantation owner has assessable income to cover the allowable deductions. If the plantation owner has no assessable income,

the deductions must be carried forward until such time as they are covered by income. This usually involves continued interest payments and increases the capital requirements.

A further complication is that proceeds from sales of forest produce from private plantations are taxable in full. This cancels out many of the tax deductions allowed for forest investment.

Until the taxation system is reviewed and a separate section for forestry inserted in the income assessment act, the discrimination against pure forestry investment through the taxation system will continue.

9.2 FARM WOODLOT SCHEMES

Two State Governments (New South Wales and Victoria) have low interest loans to assist private farmers.

9.2.1 The Victorian Woodlot Scheme

The Victorian Government introduced legislation early in 1965 to provide loans to individual land owners who propose to establish private softwood plantations of approved species in that state.

The conditions relating to this assistance are as follows:

The size of the loans to landowners have to be at least $150 and not more than $5,000 and may not extend for more than 25 years. The owner is required to plant a minimum of two hectares within two years of receiving the loan.

No interest is payable for the first twelve years, but from that date interest is charged at 5 percent and capital repayments

commence in half yearly instalments. The amount advanced must not exceed $125 per hectare to be planted. The entire undertaking is subject to an agreement involving covenants on the part of both the landowner and the Victorian Forests Commission.

9.2.2 The New South Wales Scheme

The New South Wales Government in August 1966, established a scheme whereby long term loans were offered to property owners to establish woodlots.

In suitable areas, loans of $125 per hectare were made available for pine plantings and $200 per hectare to establish poplar plantations. Loans would also be considered for other approved tree species.

Plantation areas had to be a minimum of 2 and a maximum of 40 hectares before loans would be given. The maximum amount of any loan was $5,000.

For pine plantations, loans were available for a maximum period of thirty years and were free of interest and principal repayment for the first 15 years. For poplar plantations, loans were for a maximum period of 15 years with no interest or principal repayment for the first seven years.

The lending authority under the Savings Bank Act of New South Wales (1906) was the Rural Bank of New South Wales. Interest charges made after the initial exempt period were to be based on the "ruling rate" prescribed by the State Treasurer from time to time.

Loans will be made only to owners of properties used for agriculture or forestry and not to large companies engaged in the commercial planting of softwood.

9.2.3 Progress of the Schemes

In Victoria, under the loan scheme between 1966 and 1973 only 114 agreements were made for loans totalling $302,000 and this covered an area of 2,600 hectares.

In New South Wales, from 1966 to 1972, 120 loans totalling $383,022 have been made. The area undertaken to be planted is 2,723 hectares comprising 2,387 hectares of pines and 366 hectares of poplars.

9.3 INDUSTRY INCENTIVES

In recent times, some Australian companies have commenced offering incentives to private growers to produce low cost industrial wood. To the growers, this should mean increased long term profits per hectare.

In Victoria, Australian Paper Manufacturers (A.P.M.) offer technical assistance; supply of seedlings at cost; and a guarantee of markets for harvested wood. Appendix 1 details the incentive scheme offered by A.P.M. in Victoria. Similar schemes are offered by companies in Tasmania and South Australia.

Private owners of hardwood resource have grouped together in Tasmania (1974) to take advantage of economies of scale in negotiating selling prices. An additional advantage of this co-operative action is that some form of management regime will be practised over the resource.

In New South Wales and Western Australia there have been consultant companies established to provide consultant and management services for plantation establishment and management.

The rural land owner can employ the resources of these consultant companies by methods as -

(1) establishment carried out by the property owner who pays consulting fees only for actual planning and supervision time;

(2) payment on a "cost plus basis";

(3) a single fixed all inclusive charge for a complete establishment service;

(4) payments can be for maintenance of the plantation on a yearly or longer time scale;

(5) marketing of the produce.

A co-operative marketing organisation was formed in 1973 of poplar plantation growers in the Hawkesbury Valley in New South Wales to sell the forest produce of owners and to provide machinery for the production of finished products.

CHAPTER 10

OVERSEAS EXPERIENCES IN FARM FORESTRY

10.1 OBSTACLES TO FARM FORESTRY

In the United States of America (U.S.A.) Worrell and Ireland (1975) considered the obstacles to farm forestry to include:

1. the lack of knowledge of timber growing and processing;
2. a lack of interest;
3. owners goals for acquiring and holding forested property being incompatible with timber management goals;
4. a low profit potential.

Skok and Gregersen (1975) considered the following obstacles to also inhibit the investment of capital into the farm forestry sector.

1. the lack of perfect knowledge relating to present and future markets and prices;
2. the lack of flexibility in timber supply responses under a stable wood supply policy;
3. the differences between public and private valuation of inputs and outputs in the U.S.A. economy.

Lord (1963) highlighted the problem facing the British farmer, indicating that there was little incentive for him to invest in farm forestry ventures whilst agriculture was undergoing rapid technological change. Any surplus capital of the farmer was invested in agricultural pursuits to maintain reasonable rates of return.

The Scottish Forestry Journal (1975) discussed the reasons for curtailing or abandoning forestry/agricultural schemes in Scotland. They included lack of confidence in government policies, capital taxation proposals, high interest rates and the need for a firm price base to ensure orderly marketing.

10.2 MEASURES USED TO ENCOURAGE FARM FORESTRY

10.2.1 United States of America

The factors motivating land owners to invest in farm forestry are complex but they can be influenced by the implementation of suitable policy instruments. Worrell and Ireland (1975) in their discussion of this problem classified the levels where the incentive programmes operate economically.

They divided the instruments of policy into two main groups depending on the economic level of their action. Those working on the economy as a whole are called macro instruments while those directly affecting the firm are called micro instruments.

Macro policy instruments are best suited to overcoming the obstacles of low profitability while micro policy instruments are aimed specifically at woodlot owners.

In the United States of America (U.S.A.) there are a number of policy instruments available which can motivate investment in farm forestry. Table 10.1 lists these policy instruments by economic level.

TABLE 10.1

Policy Instrument	Influence
Macro Policies	
(a) Federal Income Tax	Provision on capital gains depletion.
(b) Trade Policies	Import quotas, tariffs.
(c) Financial System	Portfolio restrictions on regulated lenders, margin requirements, Federal banks.
(d) Monetary Policy	Regulations, open market operations.
(e) Housing Policy	Aggregate demand for forest products.
Micro Policies	
(f) General Forestry Promotion	Research and Development, fire, insect, disease control, public information.
(g) Marketing Aids	Price reporting, market advice, Co-operatives, market guarantees.
(h) Subsidies	Special property tax treatment for forest property, cost sharing for forest operations.
(i) Management Aid	Technical advice and information. Management contracts or leases. Equipment pooling, education and training.

(Source: Worrell and Ireland, 1975)

Skok and Gregersen (1975) discussed the incentives provided in the U.S.A. to encourage farm forestry.

1. The Provisinn of Direct Incentives

These incentives provide identifiable monetary benefits to those owners who fulfull certain management conditions. An example of this type of approach was the Agricultural Conservation Programme (1936). This programme was designed to stimulate tree planting and tree improvement programmes in the dust bowl areas. In recent years, its name has been changed to the Rural Environmental Assistance Programme. It had covered 1 percent of the non industrial private land in the U.S.A.

2. Indirect Incentives

Indirect incentives are usually designed to bring about an increase in the level and quality of the technical and marketing information and assistance available to woodlot owners.

Some indirect incentives increase the effectiveness of direct incentives. The form of these incentives include active government assistance with the formation and running of co-operatives and associations which help to increase the knowledge of woodlot owners with information on investment and development of woodlots. They offer the means for woodlot owners to achieve economies of scale in the utilisation and marketing of their forest produce.

3. Industry Incentives

The aim of this type of incentive is to provide more wood for industry.

The principal incentive programmes provided by government agencies for farm forestry in the U.S.A. are shown in Table 10.2.

TABLE 10.2 Principal Public Incentive Programs for Farm Forestry in U.S.A.

Type	Effectiveness
Direct, Fiscal (Exemption, remission or deferred payment of taxes)	
1. Capital gains treatment for timber.	Of greatest importance to industrial ownership. It involves procedures too complex to be of interest to many non industry small private forest land owners.
2. Yield taxes	Declining in acceptance.
3. Modified property tax laws	Increasingly popular approach.
4. Tax exemptions and rebate laws.	Limited effectiveness as practised. One of the earliest forms was adopted by Michigan and Wisconsin in 1867.
Direct, Non Fiscal (Subsidization of inputs through low cost credit, outright subsidies).	
1. Forestry Incentive Program (F.I.P.)	This is now the main direct subsidy or cost share program for timber production.
2. Rural Environmental Assistance program - practices A.7 (planting trees and shrubs) B.10 (Stand Improvement).	Main cash payment program prior to F.I.P. program.
3. F.H.A. loans and other subsidised loans.	Low interest, long term for forestry purposes. Limited usefulness to date.
4. Low cost seedlings	Partly financed with federal funds.
Indirect (Government Research, training technical assistance, extension, marketing, information).	

TABLE 10.2 (Cont'd)

Type	Effectiveness
1. Funding of extension foresters, co-operatives	Programmes carried out by Federal and State governments in conjunction.
2. U.S.A. Forest Service, and University applied research programmes.	Effective dissemination of results through extension and other outlets.
3. Furding of production and marketing co-operatives.	These are funded partially by Federal, private and state funds. Not been very successful to date.
4. Public co-operative forest protection programs such as Clarke McNavy Act and Forest Pest Act of 1947.	Necessary since fire, disease and insects do not recognise ownership boundaries and represent large risks without the provision of protection strategies.

(Source: Skok and Gregersen, 1975).

Skok and Gregersen (1975) concluded that there was little known about the effectiveness and efficiency of the multitude of existing forestry incentive programmes. Consequently, it was important that alternative programmes be evaluated for their past effectivness. The promising programmes should also be examined with a view to improving their efficiency and effectiveness and where desirable to expand them.

10.2.2 Great Britain

1. Direct Measures to Encourage Farm Forestry

The encouragement of farm forestry in Great Britain has been undertaken largely through the provision of direct grants and tax remissions.

Urquhart (1966) considered the most important aspect in the remission of taxes was the provision for landowners to deduct the nett costs of plantation establishment from income before taxation. After the transfer of ownership of a woodlot, the new owner had to pay a low annual tax based on the land value irrespective of the financial yield of the woodlot. Death duties were payable only once during the rotation length of the crop and then only when clearcut.

In the long term in Great Britain, Urquhart (1966) considered tax concessions to be essential for the continued development of the private forestry sector.

The form of the direct grant measures made by the Government towards the cost of establishment and maintenance operations for woodlots (Urquhart, 1966) were:-

(1) For new plantation establishment, £56(Stg.) was available (S.T.G.) per hectare for planting and establishment.

(2) For maintenance and management of woodlots dedicated to sustained yield, the grant was -

£1.012(Stg.) for the first 40.5 hectares; (S.T.G.)

£0.686(Stg.) for the next 40.5 hectares; (S.T.G.)

£0.436(Stg.) on the balance. (S.T.G.)

2. Indirect Measures Used to Encourage Farm Forestry

The last two decades have seen a considerable increase in the role of forestry consultants both in directing the management of small holdings and co-ordinating the activities of woodlands which consisted of small units of ownership.

The forestry co-operative movement has developed slowly. Initially, it had to get the confidence of owners. The main area of activity was Scotland. The co-ordination of marketing, supply of labour, machinery and materials, developed where a number of estates employed the same forest manager. This voluntary cohesion among estates was built up from the lower eschelons.

In 1956, a government enquiry into the private forestry sector led to the formation of representative bodies to take care of all the interests within the private forestry sector. Two associations were formed following the enquiry. In Scotland, the Scottish Woodland Owners Association (S.W.O.A.) was formed to provide commercial services and representation for its members. Of its members, seventy percent own less than 80.9 hectares of woodlands and only 10 percent own over 202.4 hectares.

In England, the Timber Growers Association (T.G.O.) was formed. It decided not to provide any commercial services for its members, leaving these to be provided by consultants and forestry co-operatives. Its major role was to concentrate upon representing and clarifying the interests of its members.

Lorrain Smith (1969) identified three main trends which became apparent with the development of co-operatives and grower's representative bodies.

(1) The growing sense of purpose on the part of the woodland owner.

(2) More efficient representation of growers.

(3) Provision of closer consultation between the various sections of the forestry sector.

10.2.3 Sweden

Forestry co-operatives in Sweden have experienced substantial growth during the last decade. Ownesjo (1966) indicated that co-operatives have led to an increased level of activity in forestry and had improved the financial interests of members. There had been a substantial increase in co-ordinated harvesting, investment in co-operative ownership of road making and logging equipment, a more rational use of labour and the permanent employement of technical staff.

Ownesjo (1966), when examining the measures used to stimulate forest investment by landowners concluded, the availability of credits and taxation system measures to be the most important.

In conjunction with these financial stimuli, other measures were:

(1) Research and training of labour.

(2) The establishment of co-operatives which enable owners to keep abreast of technological development, to achieve a more rational use of labour and to improve the marketing system.

(3) The implementation of public forest policy through legislation. The aim of forest policy is to eliminate the drawbacks of small holdings yet still retain the freedom of action of individual owners.

Currently in Sweden, some forty percent of the labour force is provided by farmers with joint family forestry enterprises. The development of co-operatives is increasing the availability of labour to the forest owners.

10.2.4 New Zealand

The New Zealand loan scheme described by Slinn (1968) was available only for the establishment or management of exotic softwood plantations. Inexpensive insurance was available to cover losses through fire occurring in the first ten years. (The single premium of NZ$3.50 per hectare (total time period) could be added to the loan if desired).

The loan scheme lent up to $200 per hectare to cover planting and tending costs incurred by the farmer. If the work and subsequent management was carried out satisfactorily, fifty percent of the loan was written off and the balance carried forward at three percent compound interest till the time of the first major sale.

The loan scheme was copied by two Australian States. In July 1969, the United States Forest Service introduced a similar scheme to supplement their grants scheme, as this scheme was inadequate.

An indirect measure of encouragement to private forestry had also been provided to farm forestry in New Zealand by exempting from death duties, the value of forests which were part of a deceased estate.

The loan scheme in New Zealand was replaced by a Forestry Encouragement grant as reported in the editorial of the New Zealand Journal of Forestry (Vol.15 No.2, 1970). The grant scheme was made available for private and small company plantings. The grants were an alternative to the existing tax concessions whereby companies

could deduct the cost of planting, and managing a forest against current income. The grants were to be equal to half of the qualifying expenditure incurred in planting, maintaining and developing an approved planting programme.

For the long term development of farm forestry in New Zealand, it may have been more appropriate to retain the loan scheme to supplement the grant scheme.

10.3 OVERSEAS STUDIES

10.3.1 Economic Planning in Forestry

Molmborg (1966) in his discussion of economic planning of Farm Forestry in Sweden highlighted the fact that the cutting programme was a direct result of economic considerations, not just an environment of evenly distributed age classes and cutting regimes.

His economic planning was based on budgetary methods, such as, a budget of one unit of a certain activity, for example; the harvest per acre or the income per unit of livestock. These budgets would then be combined in different ways into a large number of different models. Provided production was linear (that is, earnings and requirements of the resources were unaffected by the extent of the operation) the optimum production method relative to prior conditions specified could be selected by using linear programming.

Molmborg pointed out that linear programming methods could be applied to find the optimum production model even although the introduction of co-operatives had led to encomies of scale with small woodlot owners.

Lorrain Smith (1969) in his examination of the economy of the private woodlands in Great Britain defined eight conditions which must be fulfilled, if woodlot plantings on any scale were to be economic propositions.

The necessary conditions were that there must be:-

1. a demand for timber;
2. a satisfactory price;
3. available capital;
4. adequate communications;
5. cheap and readily available labour;
6. technical knowledge;
7. political stability;
8. a favourable system of land tenure.

10.3.2 Business Economies of Mixed Farms

Brandl and Lobell (1974) described a study of the business economics of mixed farms in West Germany on the basis of interviews carried out in 1973, with fifty farmers holding from ten to one hundred and sixty hectares of forest land. They employed little outside labour (with the exception of owners with more than one hundred hectares).

Overall, the forest operations tended to show a profit but in about half the farms, the forest enterprise would have made a loss if the family's working time was valued at DM7 per hour. This applies particularly to smaller holdings (ten to thirty hectares of forest) where yields and productivity are low, and the contribution

of forestry to family income is of minor importance. However, forest holdings of 60 to 100 hectares provided 80% of family income.

10.3.3 Co-operative Schemes

Brandl (1974) carried out a financial study of a co-operative covering 150 hectares formed from many small holdings in West Germany and managed as an integrated unit. The existing coppice had been converted to conifer twenty years previously and access roads had been built.

Results in terms of additional nett annual yield per hectare occurring to owners are positive only if the state subsidies are taken into account.

One problem was the great increase in administrative costs. It was questioned whether full integration which requires intensive management was the best way of deploying scarce managerial skill in promoting good forestry in small woodlots. This is pertinent considering the danger of weakening the owner's personal interest.

It was considered that co-operatives should concentrate on tasks that clearly assist the individual holder (joing buying and selling), but should involve integrated management only in exceptional circumstances.

Brandl considered that the justification of subsidies to forestry needs to be closely examined and clarified. Co-operatives should not only consider logging equipment but also agricultural equipment for keeping abandoned agricultural land open by mowing or brush cutting.

Vesikollio (1974) examined the regional co-operation scheme in Farm Forestry in Finland. He explored the possibility of controlling wood costs (harvesting and silvicultural operations) through regional co-operation.

He calculated costs of harvesting and silvicultural operations for nine regions in Finland using three alternative models.

The models were:

(1) separate management and ownership for each forest unit;

(2) joint management and separate ownership for forest units in each region;

(3) joint management and joint ownership for forest units in each region.

The calculated costs showed that model 3 was cheaper than model 2 which was cheaper than model 1.

Helm (1968) in a study of the economics of Co-operative Enterprises in Tanzania considered that the objectives of individual forestry co-operative ventures may include any of the following:

(a) render an extension service to advise members on modern methods of forest exploitation and management;

(b) maintain a common tree nursery for planting material;

(c) undertake the direction of a joint afforestation programme co-ordinating timber planting and harvesting;

(d) provide disease and pest control schemes for common action, supply insecticides and spraying equipment;

(e) establish joint fire prevention schemes by utilising fire equipment and maintaining fire equipment;

(f) build and maintain forest roads to facilitate timber harvesting and transportation;

(g) co-operative use of special forest establishment and harvesting equipment;

(h) employ a permanent labour force to harvest timber; carry out plantation establishment and other silvicultural operations;

(i) maintain a fleet of timber transporters for road haulage of forest produce;

(j) market timber produced by members;

(k) process the timber produced by members using a common conversion plant.

10.3.4 Review of Taxation Systems

Mutch (1975) examined the taxation system in Britain and considered that a taxation system for forestry should cover the following:

(1) promote good forestry practices;

(2) promote marketing at maturity aimed at maximising the flow of wood to processing plants;

(3) encourage regeneration to ensure long term sustention of forest yield;

(4) penalise speculative holding of standing timber especially into over maturity and senility;

(5) the main tax burden should be timed to fall when there is a saleable product and money yield (normally this will be at clearfalling).

(7) taxation should be related to the long term earning capacity of the resource, and should penalise the destruction or neglect of a forest by selfish proprietors;

(8) remission of tax or other advantages of tax provisions should be restricted where possible to those owners genuinely seeking to increase or maintain production and should penalise those who wish to hold the resource in its unused state as a tax dodge;

(9) consideration should be given to the provision of financial grants for planting rather than allowing remission of taxation. This would ensure a more equitable distribution of the incentive measures;

(10) taxation of forestry should take into account the costs of providing public access, planting constraints such as amenity requirements, wildlife protection and water production;

(11) for tax purposes (both income and capital gains taxes) forestry should be considered with its related industries, as agricultural enterprises or as an enterprise in its own right not linked with any other business activities.

10.4 PROBLEMS IN FARM FORESTRY

10.4.1 Marketing of Forest Produce

Even with the development of co-operative marketing, Lorrain Smith (1969) indicated that in the short term it would be difficult to alter the traditional methods of selling. In Great Britain a rapid change in marketing strategies would not occur

immediately because a high proportion of woodlots were young and still unmarketable.

Lorrain Smith concluded that in order to advance the investment in woodlots, maximum effort must be given to marketing organisation.

Urquhart (1966) discussed the problems facing the forest products sector in Great Britain. The forest products sector is not protected by tariffs and must compete with imports in quality, quantity and price. Prices have been low for local forest produce mainly because of the poor quality and small log sizes available from the local resources.

With the development of woodlots, the key to efficient marketing would be the grower's ability to ensure a balanced supply to industry, thus creating a profitable price base.

10.4.2 Problems in New Zealand

Justin and Knowles (1974) in their review of farm forestry in New Zealand indicated that the majority of plantings were less than seven years old and the economic viability of the concept of joint agricultural and forestry production on the same area of land has yet to be demonstrated. This was because detailed financial evaluation on the agricultural aspects of pasture production and animal performance under various Pinus radiata densities as they grow from age seven to maturity was not available.

Justin and Knowles (1974) highlighted the following areas which require examination in New Zealand to ensure that farm forestry was profitable.

(1) An assessment of the effect of trees grown at different spacings and stand densities on pasture production throughout the life of the forest stand.

(2) Determination of any side effects that agricultural production other than pasture may have on tree crops and vice versa.

(3) Research into land preparation and tree establishment techniques in pastured land.

(4) Research into pasture management. Knowledge is required on the means of manipulating earlier grazing and controlling weeds, the performance and palatability of different pastures and to determine which pasture species can be grown under tree canopies.

(5) Extend the concept of tree planting to species other than P. radiata.

(6) Within a specific region, determine where the integration of forestry with farming is most applicable and beneficial.

CHAPTER 11

PROPOSED MEASURES OF ASSISTANCE TO FARM FORESTRY IN AUSTRALIA

11.1 INTRODUCTION

The recently elected coalition Australian Government has undertaken in its Primary Industries Policy of November 1975 to encourage farm and private forest investment. In its election policy statement on primary industry, it stated:

"Farm and private forest investment will be encouraged to help reduce the need to clear native forest for the planting of softwood. This investment should also provide significant environmental and financial benefits to rural and urban communities alike." (Reported by Gentle, 1976).

Gentle (1976) highlighted the significance of this wording because it places the emphasis on financial aspects and not on technical aspects as many foresters have done in the past. Any system of natural resource production will only gain wide acceptance by rural landowners if it will increase the long term nett profits per hectare.

If the government sector wishes to encourage the concept of farm forestry, it must design incentives which will guarantee increased profits per hectare in the long term. In designing incentives, the government cannot encourage landowners in isolation but must give equal consideration to the market factors. Industry will only purchase raw materials for processing if they are of low cost, reasonable

quality and in sufficient quantity. If a landowner wished to use his farm forest to produce recreation amenities, the charges imposed on the recreation usage must not be so high as to discourage visitor usage of the area on a reasonably continuous basis but the charges should be sufficient to ensure a profitable return on the investment.

The concepts of farm forestry was also attractive to State and Federal Governments when rural reconstruction policies were considered. It offered the means to complement agriculture by minimising wastage of existing capital works and pasture and causing only gradual changes in pastoral based production.

11.2 EVALUATION OF PRESENT ASSISTANCE

Current measures of assistance have had little effect on stimulating significant interest in farm forestry amongst rural landowners.

The financial and investment frameworks of the Federal Government, in particular, the taxation system, although of some assistance to industrial forestry, relate mainly to business enterprises none of which have the unique problems and characteristics of Forestry. The Finance panel of Forwood (1974) concluded that Forestry would be more equitably dealt with under the taxation act if it were covered separately with its own provisions in the Act. Death duty or the fear of it has been a significant disincentive to the investment in farm forestry enterprises.

The low interest farm woodlot schemes need revising. Any incentive value created by them has been eroded by inflation.

Many individual farmers have not wished to take advantage of these farm woodlot loans for the legal requirements encumbrance

portion or all of their land. Work carried out on a woodlot by the farmer or members of his family cannot be claimed either directly as expenditures for the loan or as an income tax deduction.

Woodlot scheme funds are tied to stringent State budgets and there is no guarantee that money will be allocated in successive budgets. Farmers are always wary of investing capital in a commodity which the Government refuses to support on a firm and continuous basis.

The farm woodlot loan, even when taken up by a farmer is only available for a limited area and in most cases, the farmer will not be able to expand his woodlot until returns are forthcoming some fifteen years hence.

Farm woodlot loans were available only to individual owners whereas the majority of viable farm units in Australia are companies (largely comprised of family members) or partnerships. Consequently there had been little incentive to the successful rural producers to consider wood production as an alternative form of land use.

Until the stumpage prices set by the State Forestry producers are adjusted to include all costs of production which private forestry has to carry, (these include company tax, local government rates and land tax) it is unlikely that much interest will be shown in using wood production to increase profits on rural holdings.

The measures of assistance have failed because insufficient attention was paid to market outlets and prices for wood, and they distorted the efficient use of resources in rural areas.

11.3 OBJECTIVES OF INCENTIVES

When considering measures of assistance to farm forestry, the measures must be designed to encourage the production of the most profitable economic good. In forestry terms, this could mean recreation, water production or wood production. As there are costs involved in producing these goods Government measures should be designed to produce these products at minimal real cost.

If any measure of assistance is to be successful, it must motivate owners through the guarantee of increased profits per hectare.

Where farm forestry is being considered by Governments for rural reconstruction purposes, measures of assistance must be compatible and should be designed to increase economic efficiency in resource use regardless of location. At the regional and district level they should be integrated through land use planning based on economic analysis of alternative land use activities.

Through such planning, one could envisage owners of rural land close to urban areas, being given assistance to plant trees for recreation, close to water catchment areas being given assistance to establish tree crops to ensure water production, or near centres of State or privately owned large wood resource areas, being given assistance to produce low cost industrial wood.

Without such comprehensive land use planning, the situation will continue where one sector of the community is attempting to encourage land owners to establish tree crops on good pasture land, another sector wants hill or marginal agricultural land planted, and others want to convert low grade Eucalypt forest into fast growing softwood plantations.

11.4 MOTIVATING LAND OWNERS TO UNDERTAKE FARM FORESTRY COULD BE ACHIEVED BY THE FOLLOWING MEASURES

11.4.1 Direct Fiscal Incentives

These incentives provide identifiable monetary assistance to land owners who fulfill prescribed conditions. Both the background policies and the incentives must be created at the national level for they affect the economy as a whole.

This group of incentives include exemption, remission or deferment of certain taxes. However, rural landowners will only respond if the profitability of forestry ventures are made more attractive either by market price adjustment or by restructuring income tax, capital gains tax, land tax and probate tax structures, tailored to the nature of the forest crop.

Private forestry (in all forms) would be more equitably dealt with under the taxation act (unless already covered by existing provisions because of its definition as primary production or because of its alinement with the mining industry) in its own right with specific provisions within the Taxation Assessment Act.

There should be no discrimination with taxation concessions against different categories of land ownership particularly as all farmers receive agricultural subsidies regardless of ownership class.

In Section 10.3.4 the objectives which a separate section for forestry within the Taxation Act were discussed. The major points of relevance to the Australian scene include:

(1) encourage regeneration to ensure long term sustention of forest yield;

(2) penalise the speculative holding of standing timber especially where stands are held beyond financial maturity;

(3) the main tax burden should occur when the stand produces a saleable product and money yield (normally this will be at clear felling);

(4) taxation should be related to the long term earning capacity of the resource;

Specific types of concessions which could be made available to landowners for forestry investments include:

(1) The income averaging principles that currently apply to primary producers be made applicable to farm forestry ventures and an extension of the period for averaging incomes be made from five to over twenty years. This would considerably decrease the disruptive effect of fluctuations in returns caused by intermittent thinnings.

(2) Allow some measure of relief from land tax and local government rates.

(3) Instigate government supported loans which allow for the deferred repayments of principal and interest to suit the peculiar cash flow of forestry cash crops.

(4) Make the value of the asset exempt from death duty or the liability for duty assessed and payment of it be deferred until the woodlot is harvested.

11.4.2 Direct Non Fiscal Measures

These measures are designed to achieve indirect financial assistance to landowners by reducing the costs of inputs either directly through subsidies on inputs or indirectly through the provision of low cost credit.

These subsidies could be given by either the State or Federal Governments.

The present system of subsidies through farm woodlot loan schemes are examples of this type but are outdated and their value has been eroded by inflation.

To some extent, they could be replaced by a system of grants covering a proportion of the cost of establishing plantations on rural holdings.

11.4.3 Indirect Measures

Indirect incentives are usually designed to bring about an increase in the level and quality of the technical and marketing information and assistance available to woodlot owners. Some indirect incentives increase the effectiveness of direct incentives. The form of these incentives include active government assistance with the formation and running of co-operatives and associations which help to increase the knowledge of woodlot owners with information on investment and development of woodlots. They offer the means for woodlot owners to achieve economies of scale in the utilisation and marketing of their forest produce.

These measures could be implemented as micro-policies of the Federal and State Governments, local government agencies, wood product companies and timber associations.

Federal and State Governments should establish suitable extension agencies consisting of agriculturalists and foresters able to provide integrated farm forestry advice and services. The policy and direction for such activities should come from national and

regional land use planning authorities. These measures would help achieve the most economic use of land within a given locality.

11.4.4 Industry Incentive Measures

Industry in Australia has recently implemented programmes aimed at encouraging rural landowners to provide more wood for industry. This has so far involved the companies supplying seedlings at cost, technical advice and the guarantee of market outlets for the wood.

11.5 AREAS OF FURTHER RESEARCH

In reviewing the development of farm forestry under Australian conditions, it became evident that further research is required into the following areas.

(1) Economic planning studies of farm forestry ventures.

(2) Analyse the effectiveness of alternative incentive programmes by examining the impact of previous programmes in order to improve and expand those which are the most effective or likely to be most effective.

(3) Assessment of the effectiveness of different tree spacings and stand densities on pasture production throughout the life of the forest stand.

(4) Examination of any effects that agricultural production other than pasture may have on tree production or tree production on agricultural production.

(5) Examination of the effectiveness of different methods of land preparation and tree establishment on pastured land.

(6) Research into pasture management including the methods of achieving earlier grazing and weed control;determining the performance and palatability of different forage species under tree canopies and the methods of establishment of forage plants in forested areas.

APPENDIX I

A.P.M. Forests offers farmers new incentives

FARMERS and absentee landholders in west and central Gippsland who are considering or are already in tree farming as a diversification of income will be interested in an incentive scheme by APM Forests Pty Ltd of guaranteeing a market for pine pulpwood and sawlogs. It is complementary to the Victorian Forests Commission Farm Forestry scheme.

With the present decreased returns on rural land, farm forestry offers some landholders the opportunity of increasing their returns by diversifying their land use with pine plantations.

The Victorian Government's farm forestry scheme administered by the Forests Commission, provides loans to encourage landholders to establish commercial plantations of Pinus radiata.

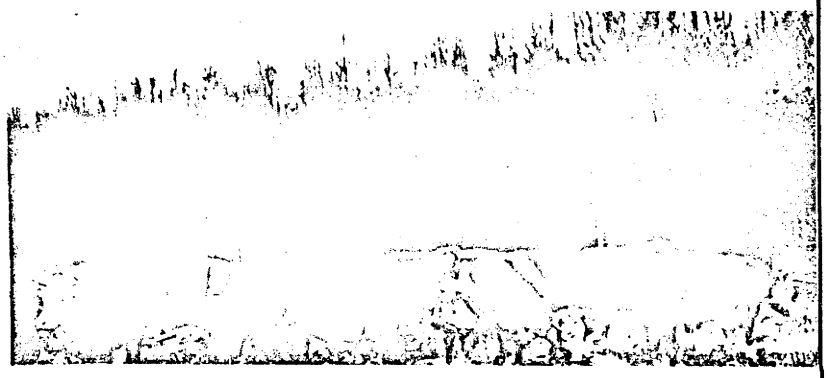
Additional incentives are now offered by A.P.M. Forests Pty Ltd, with the concurrence of the Commission, to Gippsland farmers who participate in that scheme; Gippsland being defined here as an area south of the Great Divide, east of Melbourne and west of the Mitchell River.

These incentives, which are available to landowners who make arrangements with the company, are:-

- The guarantee of a market for the wood harvested from the farm plantations with prices ruling at time of harvesting;
- The supply of pine seedlings at cost;
- The offer of additional technical assistance, where the company has special knowledge, with silviculture, protection and economic management; (Such advice will complement the Forests Commission's existing Working Plan and in no way is meant to replace this arrangement.)
- The company also offers to provide farmers with introductions to contractors for plantation establishment, maintenance or harvesting, if required.

A.P.M. Forests Pty Ltd, a wholly-owned subsidiary of Australian Paper Manufacturers Ltd, is responsible for supplying A.P.M.'s mills with pulpwood and sawlogs.

Although the company has extensive pine plantations in Gippsland it cannot itself, nor does it plan to, produce all of A.P.M.'s requirements of this type of wood for its Gippsland mills. To make up the deficiency some pine wood at present has to be brought from outside Gippsland.



A block of seven year old pines (1968 planting) gives ideal shelter from wind for Hereford cattle on a Gippsland farm.

Advantages of Pines

A pine woodlot on a farm may be profitable for a number of reasons:-

- It can provide a cash crop from time to time which may be adjusted within broad limits to balance income over several years.
- Some establishment and maintenance costs are deductible from income for taxation assessment. Trees grown as a commercial plantation do not increase land tax or shire rate valuations.
- It can provide shelter for stock and improve pasture growth on the lee side.
- It enables rough, steep or otherwise unused farmland to be brought into production.
- Pines choke out noxious weeds and so reduce the annual cost of noxious weed control.
- The farmer can do most of the work himself and special equipment is seldom necessary.
- Pines can be effective for erosion control.
- Pines will increase the resale value of a farm.
- Growing of forest produce is a hedge against inflation.

Pinus radiata is the most suitable species for Gippsland. This species of pine requires:-

- A reasonable rainfall — 700mm (28 inches) and above.
- A well drained soil i.e. avoid swamps.
- A reasonable depth of soil (i.e. at least 600mm or 24 inch depth). Shallow heavy clay soils or poor deep sands will not produce as much wood as will better soils.
- A reasonable fertility level in the soil.

Planting costs

Planting costs vary considerably depending on how the owner covers his overhead expenses. For a successful plantation the site must be cleared of scrub and if clearing is necessary this is the major cost. Fencing to exclude stock is necessary in the early years of the plantation and rabbits must be eliminated.

Where the site is carrying grass or bracken only and all work is undertaken by contract, costs representative of average conditions in Gippsland are likely to be —

Costs per hectare	$
Fencing	25 - 30
Soil Preparation	30 - 35
Planting	50 - 55
Seedlings	20 - 25
Fertilizer, Vermin Control, Fire Dams, Other	30 - 45
	$155 - 190

If clearing of heavy scrub is required this cost will be additional and can be high.

It should be remembered that farmers can frequently establish a small pine plantation on part of their fenced, cleared, grazing land for about $150 per hectare. After establishment some maintenance may be required. For instance on some areas pines may be choked out by competing scrub and the scrub must be cut or lightly cultivated or sprayed, usually in the second and third year after planting.

Returns per Hectare

The cash returns from a pine plantation depend on:-

- the rate of growth of the trees;
- the quality of the wood;
- the distance from the market;
- the ruling market price (i.e. Forests Commission royalties) of the wood at the time of sale;
- the type of markets available.

Depending on the growth potential of the site chosen, a pine plantation can, after harvesting starts, produce a series of returns over a 25 year crop.

Whereas wheat farming, dairying and grazing return an annual income, pine plantations must be grown through to a rotation of approximately 25 years before final harvesting. Intermediate returns are available from approximately four thinnings for pulpwood beginning at age 12 years through to a final harvest at about 25 years for sawn timber and pulpwood.

An important point is that land which is not at present being used productively can be earning money under timber while the farmer is concentrating on the balance of his property. Growing timber for profit can augment income to help offset continually rising costs and provide both amenity on the farm and a "nest egg" for education or retirement.

The following tables show typical financial returns available from plantations on good average Gippsland sites and comparable returns from other forms of land use.

Royalty rates vary with locality; current representative rates are used below.

Table 1

Wood Yields and Economic Returns

A. PINES ON BEST GIPPSLAND SITES

Age of Plantation	12 yrs.	14 yrs.	17 yrs.	20 yrs.	25 yrs.
Operation	1st thinning	2nd thinning	3rd thinning	4th thinning	Clear Fell
Product	Pulpwood	Pulpwood	Pulpwood	Pulpwood & Sawlogs	Pulpwood & Sawlogs
% of Product	100	100	100	60 40	25 75
Yield (m^3 per hectare)	60	50	50	36 24	80 240
Royalty Rate per m^3	$3.46	$3.46	$3.46	$3.46 $12.00	$3.46 $12.00
Gross Return from Operation	$207.60	$173.00	$173.00	$412.56	$3156.80

Total gross return over 25 years per hectare = $4123.00.
This gives an average annual return per hectare of $165.00.

Table 2

Wood Yields and Economic Returns

B. PINES ON AVERAGE GIPPSLAND SITES

Age of Plantation	12 yrs.	14 yrs.	17 yrs.	20 yrs.	25 yrs.
Operation	1st thinning	2nd thinning	3rd thinning	4th thinning	Clear Fell
Product	Pulpwood	Pulpwood	Pulpwood	Pulpwood & Sawlogs	Pulpwood & Sawlogs
% of Product	100	100	100	60 40	25 75
Yield (m^3 per hectare)	55	45	50	30 20	50 150
Royalty Rate per m^3	$3.46	$3.46	$3.46	$3.46 $12.00	$3.46 $12.00
Gross Return from Operation	$190.30	$155.70	$173.00	$343.80	$1973.00

Total gross return over 25 years per hectare = $2835.80.
This is equivalent to an average annual return per hectare of $113.43.

Table 3

Annual Returns from Other Forms of Land Use in Australia

(Bureau of Agricultural Economics — Averages for years shown.)

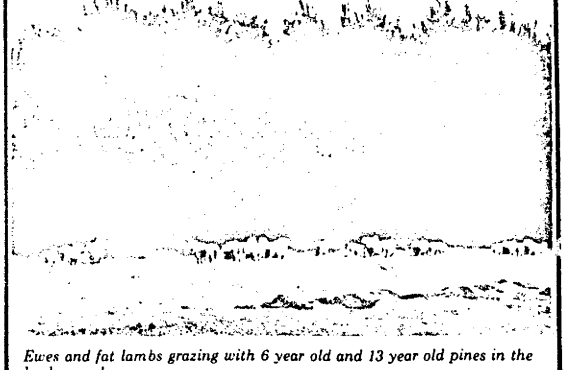
	Wheat Farming	Dairy Farming	Sheep Grazing: Wheat-sheep Zone	Sheep Grazing: High Rainfall Zone
	(3 yrs. to 1971/72)	(3 yrs. to 1973/74)	(1969-70)	(1969-70)
Av. Prodn/hect.	1.17 tonne	2.40 kl milk	11.11 kg wool	20.45 kg wool
Gross Return (Product)	$45.03 per ha sown	$185.72 per cow	$13.25 per ha grazed	$27.51 per ha grazed

Further information

A.P.M. Forests Pty Ltd has a highly trained professional staff living in Gippsland who will give advice on a particular site, on the suitability of land, the costs, the methods that should be adopted and the cash returns that can be expected.

The Gippsland office of A.P.M. Forests Pty Ltd, Box 37, Morwell, is handling all enquiries re supplies of seedlings and advice. Telephone (051) 34 3433.

Information may also be obtained from the company's offices at Sale, Box 379, P.O. Sale or Telephone (051) 4 3343.



Ewes and fat lambs grazing with 6 year old and 13 year old pines in the background.

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